View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by WestminsterResearch

UNIVERSITY OF
LEADING
THE WAY
WESTMINSTER

WestminsterResearch
http://www.westminster.ac.uk/research/westminsterresearch

Accessing public transport, a comparative study of Berlin and London

Christopher Paul Cook

School of Architecture and the Built Environment

This is an electronic version of a MPhil thesis awarded by the University of Westminster. © The Author, 2012.

This is an exact reproduction of the paper copy held by the University of Westminster library.

The WestminsterResearch online digital archive at the University of Westminster aims to make the research output of the University available to a wider audience. Copyright and Moral Rights remain with the authors and/or copyright owners.
Users are permitted to download and/or print one copy for non-commercial private study or research. Further distribution and any use of material from within this archive for profit-making enterprises or for commercial gain is strictly forbidden.

Whilst further distribution of specific materials from within this archive is forbidden, you may freely distribute the URL of WestminsterResearch: (http://westminsterresearch.wmin.ac.uk/).

In case of abuse or copyright appearing without permission e-mail repository@westminster.ac.uk

ACCESSING PUBLIC TRANSPORT, A COMPARATIVE STUDY OF BERLIN AND LONDON

CHRISTOPHER PAUL COOK

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE UNIVERSITY OF WESTMINSTER FOR THE DEGREE OF MASTER OF PHILOSOPHY

SEPTEMBER 2012

ABSTRACT

Berlin and London are both major European capital cities with extensive public transport networks. The main motivation for this study stemmed from my extensive experience travelling around independently in both cities on public transport as a totally blind person. I wanted to gain a much greater insight into, and understanding of, the various practical and policy issues, which are involved in making the Berlin and London public transport networks as accessible as possible to people with a wide variety of physical and sensory impairments.

Accessibility is defined as the physical access passengers have e.g. walking time to their nearest bus stop or railway station, and once there, how easy is it for them to board and alight from the vehicles and reach their destination i.e. frequency of service, and direct services versus the need to change en route. The provision of other soft factors such as good quality customer information systems, both at the stations or stops and onboard the vehicles, is also discussed.

Accessibility is an important aspect which may help to explain some aggregate trends and differences in public transport ridership in Berlin and London. These are further investigated by examining the market share of public transport and the passenger trip rates per head of population in Berlin and London, to analyse the explanatory factors behind the trends in both cities and identify possible transfers in good practice between them. This may include such phenomena as differences in fare levels for users e.g. cash fares, travelcards and prepay smartcards, as opposed to concessionary fare schemes.

Some other significant relationships concerned with household size, levels of cycling and car availability are analysed through numerous cross tabulations using the Mobilität in Deutschland (MiD 2002) and National Travel Survey (NTS 2002-2008) aggregated data sets.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES AND CROSSTABULATIONS

LIST OF TABLES AND CROSSTABULATIONS (CONTINUED)

LIST OF TABLES AND CROSSTABULATIONS (CONTINUED)

ACKNOWLEDGEMENTS

The author wishes to thank the following people most sincerely for their invaluable contributions to the study.

Peter White and David Whibley, for their support, guidance and constructive feedback throughout the study.

Christine Albrecht of BVG, Bettina Jeschek and Angelika Simon of Berlin S-Bahn and most notably Wayne Trevor of TfL for their time, enlightening interviews and invaluable assistance with my research.

Mike Fisher, for his wonderful blend of expert, impartial advice and tremendous sense of humour, which were always very much appreciated.

My parents Robin and Susan, partner Astrid and our Old English Sheepdogs Rocky and Indy, whose endless love and support through all the ups and downs during my research has been truly inspirational.

To Klaus, who kindly agreed to accompany me on my many field trips to Berlin and to his partner Ramona for loaning him to me for a fortnight each year. His caring attitude and patience are quite fantastic. The Berlin trips were always wonderful experiences and I really appreciated his help and company when researching and train spotting in my favourite city in the world.

To Rolf, for all his love and support over the years; He is a constant source of sound advice, encouragement and motivation for me.

This study is dedicated to all my loved ones and friends, who were not able to witness its successful completion; to the railway networks of Berlin and London, which are a constant source of fascination and never cease to amaze and astound me; and finally to the A Stock trains of London Underground's Metropolitan Line, whose sterling service of more than 50 years drew to a close in September 2012. These trains sparked my interest in railways from a young age, and provided a wonderful environment for contemplation and inspiration throughout my life and especially during my research.

THANK YOU SO MUCH FOR EVERYTHING! I simply could not have done it without you all by my side.

"IF you can keep your head when all about you Are losing theirs and blaming it on you, If you can trust yourself when all men doubt you, But make allowance for their doubting too; (…)
If you can dream - and not make dreams your master; If you can think - and not make thoughts your aim; If you can meet with Triumph and Disaster and treat those two impostors just the same;".

Lines taken from: "If" by Rudyard Kipling.

CHRISTOPHER PAUL COOK
Monday 19. NOVEMBER 2012.

AUTHOR'S DECLARATION

I HEREBY declare that all the material contained in this thesis is ENTIRELY my own work.

CHRISTOPHER PAUL COOK

MONDAY 19. NOVEMBER 2012.

CHAPTER 1

BACKGROUND TO THE STUDY

INTRODUCTION

The main focus of this opening chapter is twofold; firstly to outline the historical background of the transport networks of Berlin and London, which help explain the varying levels of accessibility to the rail-based networks as experienced by disabled passengers today. In this study, Berlin is defined by the BVG zones A and B, which encompass the whole of both the city and state of Berlin, but excludes zone C, which extends into the state of Brandenburg and the rural commuter hinterland. London is defined as the whole of the Greater London Authority (GLA) area extending out to the periphery of zone 6, which includes many medium density suburbs, but excludes more rural areas further out in the green commuter belt.

Berlin and London have vastly different histories, which have duly affected the shape and structure of their transport networks. The current population of London (7.75 million) is roughly twice that of Berlin (3.44 million). There are also considerable differences in the two cities urban form, economic structure and public transport funding, transport policy and social attitudes. All of these affect the market share of public transport and the travel patterns in each city and its suburbs.

The second objective is to define and explore the key issue of accessibility, which forms the central theme of the thesis. The following definition of

accessibility has been used throughout the study and is taken from the Social Accessibility Mapping Project (SAMP) conducted by the Transport Studies Group (TSG) at the University of Westminster (see TSG 2005). “Accessibility refers to the ability of individuals to easily reach desired goods, services, activities and destinations at appropriate times using an integrated transport system without being restricted by physical, financial or safety concerns.” (SAMP Working Project (WP)1 p.4).

Firstly a variety of general accessibility measures in wider literature are examined before considering some more specific indicators and their practical application e.g. the TfL indicator PTAL and its successor ATOS. These indicators are then contrasted as far as possible with equivalent ones in Berlin. Some of them have also been further analysed statistically in SPSS using the MiD 2002 and NTS 2002-2008 data sets. Commentaries on the key results from these crosstabulations are contained in chapter 4 and the associated numerical data in appendix A of this work.

All of these indicators highlight such factors as service frequency, the distribution of stops within a catchment area and the access/egress time from particular stops to places of employment or interest. They tell us very little however about the physical accessibility of the stops, and the ease of boarding and alighting from the vehicles for various groups of mobility impaired passengers. This includes not only people with a physical disability or sensory impairment, but also parents with children in prams/buggies or with large amounts of luggage or shopping trolleys etc. The thesis aims to plug these gaps by examining how these fundamental issues are dealt with in Berlin and London

within the wider framework of the European Union (EU) and discusses what can be done to improve the situation further.

Accessibility to the rail-based modes of public transport differs quite considerably between Berlin and London due in part to some historical reasons. In London, this is often attributable to the difficulties in installing lifts down to the deep level tube lines, although this has now been achieved at a few key interchange stations in central London e.g. Green Park and Kings Cross, prior to the 2012 Olympic and Paralympic games (see chapter 2.5). All Berlin's U-Bahn stations are much nearer the surface which presents fewer problems when improving access to them through the installation of lifts.

On mainline railways, the height of many platforms in London often means that there is a considerable gap between the platform edge and the train, which makes boarding extremely challenging or virtually impossible for many people with physical disabilities, especially those in wheelchairs (see chapter 1.3 below).

Buses do offer an accessible, but often slower alternative at street level and both cities have a 100% low floor bus fleet; Berlin since 2008 and London since 2005.

1.1

BERLIN

RAILWAY DEVELOPMENT

For a thorough account of the historical development of Berlin and its transport networks (see Wolf 1994). The first railway line in Prussia opened on 29. October 1838 and ran from Potsdam to Berlin (Potsdamer Bahnhof), a distance of around 26 km (see Hardy 1996A and Strowitzki 2002). The railway quickly proved to be a popular means of transport carrying around 600 thousand passengers in its first year of operation, which grew to 2.8 million 5 years later in 1843. Berlin's population at the time was estimated to be around 400 thousand.

Further lines then quickly sprang up around Berlin, coming in from all corners and forming a similar ring structure of railway termini as in London. A means of connecting the termini with one another and with the rest of the city and its suburbs needed to be found, in order to improve rail access to the centre of Berlin.

Two main routes were opened in quick succession. The Ringbahn (ring line) opened in two stages, the eastern half in 1871-1872 and the western half in 1877. Passenger numbers were fairly modest in the beginning for two main reasons. Firstly, the Ringbahn fares were considerably higher than those of the horse drawn trams and buses, so the majority of Berliners opted for the cheaper

transport modes or walked. Secondly, there was relatively little commuter traffic up until 1890, due mainly to the fact that most people of working age still lived within walking distance of their work (see Fabian 2000).

Fabian quoted passenger numbers for 1881 of just under 2 million for the Ringbahn and around 63 million for the combined horse drawn buses and trams. The population of Berlin on 1. December 1880 was estimated to be 1.12 million people: when combining this with the two figures for the Ringbahn trains and the horse drawn trams and buses i.e. 65 million passenger trips, this gives an average annual trip rate per head of population of 58. This compares to an annual figure of around 300 trips per capita today.

The Stadtbahn (city railway) opened in 1882 and runs from east to west entirely on viaduct right through the heart of Berlin. It was one of the first elevated railways in Europe and is connected with the Ringbahn at either end namely at Westkreuz (western end of the Stadtbahn, southern side of the Ringbahn) and Ostkreuz (eastern end of the Stadtbahn, northern side of the Ringbahn). It is the main rail artery across the city and provides vital links to many key interchange points including the central station Hauptbahnhof, which was inaugurated on 28. May 2006.

The first line of the Berlin U-Bahn (Untergrundbahn) (underground railway) opened in 1902 and was electrified from its inception. The first section of line was mostly built on viaduct following the success of the Stadtbahn opened twenty years earlier, due to the high cost of purchasing real estate. A tunnel section did have to be constructed however, which ran through the main station

at Zoologischer Garten. The line opened on 15. February 1902 and ran from Stralauer Tor (between the present day stations of Warschauer Straße and Schlesisches Tor on line U1) and Potsdamer Platz (on line U2) (see Hardy 1996B and Gymper 2002).

During the first few years of operation, the U-Bahn enjoyed steady growth in passenger numbers. In 1903 29.6 million passengers were carried and this rose to 73 million a decade later following several extensions to the original network. As many of the stations on the network are located very near to ground level, BVG has been able to install ramps and latterly lifts at well over half of all U-Bahn stations (see table 1.3 below and chapters 1.8, 2.2 and 2.5) and it is hoped that the whole network will be step free within the next twenty years.

TRAMWAYS AND BUSES IN BERLIN

The development of the electric motor by Werner von Siemens led to Berlin having the first electric powered tramway in the world. It opened in Groß-Lichterfeld (now known as Lichterfeld) on 16. May 1881. A complex tram network subsequently evolved over the next few years. It opened on 22. June 1865 with horse drawn trams, and in its first year of operation the system carried around 960,000 passengers.

Buses began running in Berlin on 1. January 1847, and by 1864 36 separate companies were operating, but many of the smaller ones failed in the following years. In 1868 the ‘Allgemeine Berliner Omnibus Akziengesellschaft’ (ABOAG), something akin to the ‘General Berlin Bus Company’, was founded and

passenger numbers reached 14 million by 1875, despite stiff competition from the horse drawn and later electric trams. The first motorised buses appeared in 1905 and the last horse drawn ones were finally withdrawn in 1920. At this time the network carried 6.5 million passengers, which represented 0.4% of public transport trips in Berlin. This was in spite of a severe lack of both horses and serviceable vehicles following the First World War. In 1929, following the absorption of ABOAG into the newly formed BVG, passenger numbers rose to 602,100 per day or almost 220 million per year. Buses usually represent a more accessible mode for many disabled people as they are located at street level, and since 2008 in Berlin, have all been low floor vehicles, which greatly facilitates independent boarding and alighting, especially for wheelchair users.

MASS ELECTRIFICATION AND THE BIRTH OF THE BERLIN S-BAHN

It was during a phase of heavy investment and extensive electrification, that the suburban lines in Berlin were amalgamated into what became known as the S-Bahn (Schnellbahn) (Rapid Transit Railway) on 24. August 1930. The distinctive symbol of a white S on a round green background began to appear from that date onwards, and at roughly the same time the U-Bahn introduced its distinctive symbol of a white U on a square blue background. The faster journey times, coupled with the increased capacity and significantly improved cleanliness of the then new electric trains all contributed to dramatic growth in passenger numbers up until the outbreak of the Second World War in 1939.

On 1. January 1929, the tram network along with the Underground and bus systems were absorbed into the newly founded umbrella organisation BVG,

which at that time stood for ‘Berliner Verkehrsakziengesellschaft’ (or Berlin Transport Company PLC). This was in a similar manner to the formation of the London Passenger Transport Board (LPTB) in 1933, chaired by Lord Ashfield, which duly took over the running of the Underground, Tram and Bus services in London. It is worth pointing out here, that both the Berlin S-Bahn and the mainline suburban railways in London remained outside these new combined transport organisations.

The first (northern) part of the new Nord-Südbahn (North-South railway) S-Bahn line opened in 1936 with the southern part opening shortly after the outbreak of war in 1939. This was the third S-Bahn line to run through the centre of Berlin and it differed markedly from the two previous ones (the Ringbahn and the Stadtbahn) by being wholly built in tunnel (see Braun 2008).

A chronic rolling stock shortage greatly hindered services after the war, as many trains formed part of Germany’s war reparations to Russia. The Russians were then compelled to loan much of the rolling stock back to the German Democratic Republic (GDR) or East Germany in the 1950s and 1960s.

The transport network was severed following the erection of the Berlin wall on 13. August 1961. The S-Bahn was owned and operated in both parts of Berlin by the East German state railway company Deutsche Reichsbahn (DR), and as a result of this, it was increasingly boycotted by West Berliners, who refused to support the socialist political regime in East Berlin, as all revenue from the S-Bahn went directly to DR. Much of the S-Bahn infrastructure in West Berlin, e.g. the tracks and stations became severely dilapidated, as West Berliners

mostly chose to use the modes of Underground and bus, both run by BVG, to complete their journeys.

Most East Berliners however travelled primarily by S-Bahn and the extensive tram network, which still existed in that half of the city. BVB (Berliner Verkehrsbetriebe) were responsible for U-Bahn and tram services in East Berlin. Buses were also used as a feeder mode for certain densely populated areas of East Berlin e.g. Marzahn and Hellersdorf, which experienced a dramatic increase in population in the 1970s and 1980s, as much new housing was built in these areas. The buses acted as a stop gap until the new housing developments could be connected, firstly to the tram network and latterly to the S-Bahn in the case of Marzahn, and the U-Bahn in the case of Hellersdorf.

REUNIFICATION AND RECONSTRUCTION

After the fall of the Berlin Wall on 9. November 1989, operations on the Berlin S-Bahn in both East and West Berlin reverted back to the former East German state railway DR, and the Berlin S-Bahn became a subsidiary of the German national rail operator Deutsche Bahn (DB) on 1. January 1994. It was made into an independent limited company ‘S-Bahn Berlin GMBH’ on 1. January 1995 and remains to this day a 100% subsidiary of Deutsche Bahn.

The transport network struggled to deal with the sudden, sheer increase in passenger numbers, which occurred literally overnight after the wall fell. The Stadtbahn bore the brunt of the increased demand, serving the border station at Friedrichstraße. Only a limited through service ran at first, but after a lot of hasty

relaying of tracks, a regular through service began on 2. July 1990, the day after the economic reunification of East and West Germany. The removal of the last of the border checkpoints from Friedrichstraße station also took place at this time.

The first batches of brand new class 481/482 S-Bahn rolling stock were delivered and duly brought into passenger service in 1996. 500 2-car sets were built by Bombardier Transportation at their two factories in Hennigsdorf and Ammendorf between 1996 and 2004. The class 481/482 trains provide Berliners with a multitude of benefits when compared to their predecessors, which had all been withdrawn by the end of 2003. These include level access between the platform and the train at most stations, wide doors to facilitate quick and easy passenger exchange and also to assist wheelchair passengers in boarding/alighting, air conditioning which is very welcome during Berlin's extremes of summer and winter temperature, and dedicated areas of the train for the safe carriage of bicycles (see Riechers 2000).

The Ringbahn, which had been severed during the division of Berlin, was also fully reinstated. The circle was finally closed on Saturday 15. June 2002 at the station Wedding and the day duly became known as 'Wedding Day'. Many picked up on this humorous twist, commenting that Berlin was once again wed to its wonderful, extensive railway network. The Ringbahn provides passengers with quick and easy access to most lines of the U-Bahn network, as well as good interchange with the extensive tram system in the eastern part of the city and also with intercity and regional trains at various stations.

A major programme of station renovation had been completed by the end of 2005. Several of the main stations on the Stadtbahn were totally modernised including the installation of lifts to assist people with heavy luggage or who are physically disabled. The improved accessibility at these stations is vital, as they are all major interchange points on the Berlin public transport network. Charlottenburg station was even relocated and realigned, to facilitate interchange with underground line U7 at Wilmersdorferstraße, in a popular Berlin shopping district.

The U-Bahn network required less work to put it back together again, because most of it was located in West Berlin and had not been physically segregated from the eastern half of the city. Lines U2 and U8 were the worst affected by the division, but through trains were running once again on line U2 by the end of 1993. A short new extension from the former terminus at Vinetastraße to Pankow, to connect with the S-Bahn and tram lines there, was completed in September 2000 (see chapter 1.7 below). Two short extensions to the U8 were built at either end of the line in the 1990s to improve access to, and offer passengers convenient interchange with, the S-Bahn. The northern extension was from Paracelsus-Bad to Wittenau on the S-Bahn Nord-Südbahn, and the southern extension was one stop from Leinestraße to Hermannstraße, located on the S-Bahn Ringbahn.

A programme of rolling stock replacement was also ongoing on the Berlin U-Bahn, and by 1990, all trains built pre-1960 had been withdrawn from service. The newest generation of U-Bahn trains are classified as type H; with two variants known as HG and HK. The HG trains began to enter service from 2000

and the HK ones from 2005. The type H trains are built as one complete unit and operate in fixed formation, 6-car HG trains and 4-car HK trains. Two HK trains are often coupled together to form an 8-car train at peak periods to provide extra capacity. The type H trains, just like their class 481/482 S-Bahn counterparts, have brought a number of new innovations to the Berlin U-Bahn, including level access between the platform and the train and enhanced passenger safety by allowing all passengers to see and walk through the train from one end to the other, a phenomenon which will soon be commonplace on the subsurface lines in London, with the introduction of the new S stock trains.

The tram network in East Berlin also underwent a programme of rolling stock refurbishment and replacement. This involved refurbishing all of the Tatra cars between 1993 and 1997, together with the introduction of several modern Siemens low floor trams. The fleet presently consists of around 40% low floor vehicles. BVG has recently placed a large order for a new generation of low floor trams built by Bombardier and known as ‘Flexity Berlin’. Deliveries are due to commence in summer 2011 and the last Tatra cars are destined to be replaced by 2017, at which time Berlin will have a 100% low floor light rail fleet (see chapter 2.8). This will vastly improve access for disabled travellers to many popular areas of Berlin.

The bus networks in East and West Berlin were merged in 1990 and the gradual introduction of new low floor buses on many routes across the city began around the same time. Berlin has had a 100% low floor bus fleet since 2008, only three years after London achieved this goal. All of the new vehicles greatly improve accessibility, especially for the elderly and mobility impaired, by

having a ramp which is automatically lowered at every stop. In the autumn of 2011, BVG announced that they wished to phase out this practice, as it was allegedly causing the ramps to fail more regularly and was having a negative effect on overall dwell times. In future passengers will need to request the use of the ramp from the driver by pressing a button on the vehicle or by talking to him directly if waiting at a stop, which is broadly similar to the practice currently adopted on buses in London.

All of the new diesel buses run on ultra-low sulphur diesel i.e. with a sulphur content of 0.001% and they are also fitted with CRT filters, which help reduce PM10 particulate emissions by around 96%. Greater use is now being made of hybrid buses and around fourteen such vehicles, known as ‘Green Buses’, were in daily service with BVG (as of summer 2009). Hybrids are fitted with batteries, which power the vehicle when travelling through city centres. The batteries are charged whilst the engine is running, when the bus is outside the city centre. They have the scope of reducing energy consumption by up to 30%. Energy produced during braking is stored in the batteries and is then used in each subsequent acceleration phase.

CURRENT AND FUTURE REGENERATION

Gough (2006) documents the complex planning process for the restructuring and revitalisation of Berlin's railways and the building of the new Hauptbahnhof. The process began in 1991, shortly after reunification had taken place and Berlin was confirmed as the capital of the unified country.

The new flagship central station is the largest cruciform station in Europe, providing Berliners with a wealth of travel opportunities. It is served by S-Bahn, regional and intercity trains, as well as the newest U-Bahn line in Berlin the U55, which began running on Saturday 8. August 2009. The 1.8 km long line runs from Hauptbahnhof to Brandenburger Tor via a new station, Bundestag, which is located very near to the parliament building 'der Reichstag'. All these new U-Bahn stations had accessibility built into them from the start, just like those on the Jubilee Line extension in London. Work commenced in 2010 to build the 2.2 km missing link on line U55 between Brandenburger Tor and Alexanderplatz, with new stations at Unter den Linden/Friedrichstraße, which will provide interchange with the north south line U6, Museumsinsel und Berliner Rathaus. The work is expected to be completed by 2019, at which time the line will be absorbed into line U5 and it will be the first wholly step free U-Bahn line in Berlin. There are also plans for a new north-south S-Bahn line S21 and construction began in June 2011. The line will link the northern side of the Ringbahn at Westhafen and Wedding to Hauptbahnhof via a new tunnel and this is also due to open in 2019. A possible southwards extension of the line to Brandenburger Tor and beyond is also envisaged, but funding for this has not yet been confirmed.

Hauptbahnhof had major accessibility features such as multiple spacious lifts between all levels and tactile strips along all platform edges incorporated into its design from the outset (see chapter 1.7). Hauptbahnhof is destined to be linked into the Berlin tram network from 2015 onwards, with the extension of the tramlines from Nordbahnhof along Invalidenstraße. Many bus routes already directly serve Hauptbahnhof, and following the completion of the tram extension, the central station will then have good transport connections to all modes of Berlin public transport in every direction, something which was clearly lacking when the station opened back in 2006 (see Ahlfeldt 2008). This includes good rail and bus connections to the new Berlin Brandenburg International 'Willy Brandt' (BBI) airport, which is due to open after a lengthy delay, in October 2013. Berlin's current lack of a single major hub international airport has been cited as a potential reason for it failing to attract multi-national companies to the city (see Ory 2004). Heinemann and Pohl (2008) outlined the challenges which face the Berlin S-Bahn, in providing a first class transport system to and from the BBI airport. The line to BBI is an extension of the current S-Bahn line from the former airport at Schönefeld via a new intermediate station at Waßmannsdorf.

Many other major interchange stations in Berlin have been extensively modernised during the past decade and some schemes are still ongoing. A complete rebuild of Ostkreuz station began in 2007 and involves the realignment of all the platforms on both the Stadtbahn and Ringbahn, as well as the provision of new platforms for regional trains. Accessibility will be greatly enhanced by the installation of escalators and lifts between all of the platforms,

as well as tactile strips along the platform edges and a new covered pedestrian bridge and entrance hall. The tracks will also be remodelled on all of the approaches and exits of the station, in order to maximise capacity on these heavily used lines. The work is scheduled to be completed by 2017, although the station should be fully operational sometime in 2014.

ONGOING OPERATIONAL PROBLEMS WITH THE BERLIN S-BAHN

2009 marked the beginning of an extremely difficult phase of the Berlin S-Bahn's history (see Streeter 2009). S-Bahn Berlin were fined €5 million by the Berlin Senate, due to falling punctuality and the cleanliness of the trains; both of which had drastically deteriorated in the first few months of that year (see Tramways & Urban Transit 2009A and 2009B). These levels of performance fell well short of the minimum requirements stipulated in the contract between S-Bahn Berlin and the federal state of Berlin. The money from the heavy fine was given to BVG, and has been used by them to accelerate their planned programme of underground station improvements, to make them fully accessible to mobility impaired passengers (see chapter 2.5 and appendices B and C).

In February 2009, The Berlin S-Bahn announced a radical package of improvement measures known as SQUASH (S-Bahn Qualitätssteigerung in der Hauptstadt), translated 'S-Bahn quality improvement in the city'. SQUASH involved operational restructuring as well as improved customer service, and the thorough and regular cleaning of the rolling stock. Punctuality greatly

improved following its introduction to over 97% (see Tramways & Urban Transit 2009B).

After a derailment in May 2009, the federal railway office (Eisenbahn Bundesamt) (EBA) ordered wheelset checks to be carried out on all Berlin S-Bahn trains (see Pucher and Buehler 2011). This led to an emergency transport summit being called and the whole top tier of management at the Berlin S-Bahn being sacked and a new management team duly installed.

At the height of the crisis in summer 2009, limited or no services ran on many S-Bahn routes. Contingency plans were drawn up which included BVG operating more buses and trams, and where possible more and longer U-Bahn trains, especially in the morning and evening peak periods. The regional railway services between Berlin, Potsdam and Spandau were also increased from 2 to 4 trains per hour, but they were unable to serve many of the intermediate S-Bahn stops due to their being no platform faces on the regional lines.

One explanatory factor for the profound effect which the S-Bahn crisis has had on public transport in Berlin is the vital role which rail plays in the city centre. Berlin is a relatively compact city with a fast rail network, which carries high passenger volumes (see UITP 2007 p.15). The role of rail is therefore relatively more important than in London, where bus takes a higher share of the total public transport market (see chapters 4.35 and 4.36).

It is envisaged that operations on the Berlin S-Bahn will be divided into separate franchises, when the current contract with the state of Berlin expires at the end of 2017 (see Streeter 2010). The network will be divided into Ringbahn, north-south (Nord-Südbahn) and Stadtbahn. Tenders for the operator of the first Ringbahn franchise are currently [September 2012] being invited by Verkehrsverbund Berlin-Brandenburg (VBB) and the new Ringbahn franchise is due to commence on 15. December 2017 and run until 11. December 2032.

1.2 RAILWAY DEVELOPMENT IN LONDON

London's Underground was the first of its kind in the world and preceded Berlin's by almost forty years. The Metropolitan Railway was the inaugural line and opened on 10. January 1863, with a 6 km (3.75 mile) line running between Bishop's Road in Paddington and Farringdon Street. The Underground continued to grow and expand, and by 1884 the Circle Line had been completed, forming a ring around central London. This connected all of the mainline termini together, which had been built as the various different railway companies arrived in the capital, in a similar way to the Ringbahn in Berlin.

Suburbs began to spring up around London, as the Underground expanded further out from the city creating a wealth of urban sprawl. Garbutt (1997) summarises the importance of the London Underground as a distributor mode. "Suburban railways already existed to carry people to and from the central zone, but a new kind of railway was needed to distribute them within the city itself." (Garbutt p.6).

The London Underground's original form of traction was steam, unlike the Berlin U-Bahn, which was electric from its inception in 1902. The early lines (now referred to as the subsurface lines) such as the Metropolitan Line were built near to the surface using the so-called 'cut and cover' method of construction. The tunnels are wider than standard tube tunnels and have ventilation shafts at regular intervals, which were vital in the days preceding electric traction. The steam locomotives utilised an innovative method of condensing and duly recycling much of the steam they produced, which greatly minimised their

emissions. It was not until the development of electric traction by Werner von Siemens in Berlin in the 1880s, that the construction of narrower deep level tube tunnels (now referred to as tube lines) became feasible (see Wolmar 2005). Most of the Underground had been electrified by 1900, and much of the network that we know today had been built by the First World War.

The London Passenger Transport Board (LPTB) was founded in 1933 and had the huge task of organising and coordinating London's transport services, whilst also delivering a programme of vital improvements at the same time. This involved extensions to the Underground, bus fleet renewals, the expansion of popular routes, from which outlying country areas benefited quite considerably, and the replacement of trams by trolley buses. Passenger levels, especially on the buses and coaches, remained very high (see Barker and Robbins 1974 p.298).

The Underground network continued to grow after the end of the Second World War and the last steam services ceased around 1960, with the electrification of the Metropolitan Line from Rickmansworth to Amersham and Chesham. Later additions to the network were built from the 1960s onwards, in the form of the Victoria line which opened in stages between 1968 and 1971, and the Jubilee line which opened in 1979, and its extension exactly twenty years later (see chapter 3.4). The majority of the Underground is concentrated north of the Thames, whilst south of the river is well served by the complex network of third rail electrified suburban lines, which form the nearest equivalent to an S-Bahn in London.

MASS ELECTRIFICATION OF LINES AROUND LONDON

Electrification programmes had begun in the 1900s and were rapidly accelerated and expanded on a similar scale to those in Berlin in the 1920s, in spite of material and labour shortages following the First World War. Much of it took place south of the river Thames, and was driven primarily by the Head of the Southern Railway, Sir Herbert Walker. This involved the widespread adoption of the 750V DC third rail system. One of the main aims behind this programme of electrification was an attempt to win back customers to the railways, who were rapidly switching to the quicker and cleaner electric tramways springing up around London, in place of slower, dirtier steam traction on the mainline railways. A further parallel between Berlin and London is the fact that many of the electrified suburban lines, especially in southeast London, were built on viaduct, just as the Stadtbahn in Berlin. In both cases, this was mainly due to the high, prohibitive cost of purchasing land and real estate, required to construct the lines at ground level. Tunnelling would have been too costly and not practical, whilst the lines were all still steam worked, so elevated lines on viaduct were the only real viable option.

TRAMWAYS IN LONDON

The London County Council (LCC) viewed their electric trams as an integral part of their transport network, which helped improve the lives of Londoners by providing them with fast, frequent services from the congested city centre into quieter, greener surroundings in the suburbs. Living conditions were far superior there and rents were often considerably lower than those in central London (see Barker and Robbins 1974 p.98).

Electric tramways played a vital role in the densely populated suburbs of south London, where they first began running in 1903. Trips per head of population per annum, on the Underground and surface rail, rose from 142 in 1901, to 210 in 1911 and 308 in 1921, whilst on all services over the same 20 year period, trips began at 177, climbing to 250 in 1911 (a conservative estimate) and reached 364 in 1921, or 382, if trips on main line railways are included (see Barker and Robbins 1974 p.13 and p.19).

The mass programme of electrified tramways required considerable investment though, and this was not far short of the £16 million deemed to be required by Charles Yerkes, an American who was in charge of constructing the network of tube railways in London, which now form part of today's Bakerloo, Central, Northern and Piccadilly Lines. This is possibly the main reason for the tram network never managing to penetrate into the centre of London, which remained wholly the realm of the underground and buses. The opposite scenario occurred in Berlin where trams ran right across the city centre until its

division in 1961, after which time the network in East Berlin remained, whilst that in West Berlin was gradually abandoned.

BUSES IN LONDON

The number of licensed horse drawn buses in London decreased from 2155 in 1908, to 1103 in 1910 and had reached only 376 two years later. During the same time period, the number of motor buses registered in London climbed steadily from 1133 in 1908, to 1200 in 1910, escalating rapidly to 2908 by 1912, which represented almost a 250% increase in just 2 years (see Barker and Robbins 1974 p.170). Bus journeys almost doubled in only three years, from 400.6 million in 1911 to 756.6 million in 1914 (see Barker and Robbins p.185).

After the First World War and excluding 1926, the year of the general strike, passenger numbers on all of London's transport modes went decisively upwards in the 1920s (see Barker and Robbins p.214). In 1920, buses carried fewer passengers than both the combined rail services (Underground and surface rail) or the trams. In the following year however the buses carried more than the trains, and by 1923 they were carrying more than the trams too (see table 1.1 below). Technical developments of the motor bus, such as better suspensions and pneumatic rather than solid tyres, were more rapid in the 1920s. Competition in the form of rival independent bus companies, as well as the motor coach, began to emerge as the decade progressed. In 1933 all of London's Underground, Bus, Tram and Trolley bus services were brought together into the LPTB, in a similar way to the formation of BVG in Berlin in 1929.

It should be noted from the point of view of accessibility for disabled passengers, that the extensive and rapidly developing bus network in and around London would seem to have represented a more accessible option to them being located almost entirely at street level, as opposed to the underground. It should of course be borne in mind that in those days, all the vehicles themselves would have been high floor and thus had several steps up into them, which would have seriously detracted from the overall ease of use typically associated with buses mentioned in the previous point.

POST-WAR EXPANSION

After the formation of London Transport in 1948, the renewal of the bus and coach fleet continued apace, as well as the opening of extensions to the Central Line of the London Underground in 1949. By 1954 the post-war fleet renewal programme was complete, and the decision was also taken to replace the trolley buses with omnibuses. Trams had already been completely phased out by 1951 and trolley buses followed in 1962. The first prototypes of what was to become the iconic Routemaster bus were delivered from manufacturer AEC in 1954, and from Leyland in 1955. Due to the use of lighter metal alloys in their construction, they weighed considerably less when fully loaded than their type RT predecessors (see Barker and Robbins p.350).

TABLE 1.1 PASSENGER TRIPS ON LONDON UNDERGROUND AND LONDON BUSES FROM 1960 TO THE PRESENT DAY

YEAR	PASSENGER TRIPS (MILLIONS) UNDERGROUND	PASSENGER JOURNEYS (MILLIONS) BUSES
1965	657	
1970	672	1150
1977	601	1145
1980	559	1118
1985/86	732	1151
1990/91	775	1178
1997/98	832	1278
2002/03	942	1606
2007/08	1096	2026

SOURCES:
London Underground: Annex A, table 1 in DfT (2008).
London buses up to 1991: table 1.3, in Department of Transport (1994). London buses from 1997/98 onwards: table 2.2 in TfL (2011).

FUTURE NETWORK ENHANCEMENTS

It is essential that there are a number of good interchange points, where customers have easy transfer between modes. In Berlin this is typified by stations such as Zoologischer Garten, Hauptbahnhof, Friedrichstraße and Alexanderplatz. They are all served by S-Bahn and regional rail services and in most cases by the U-Bahn as well. In London most interchange between suburban rail and the Underground takes place at one of the terminal stations. One notable exception in London is Clapham Junction, which has, as yet, no connection to the Underground, but is served by numerous suburban services and is situated on the busy West London Line of London Overground, and from the end of 2012 will also be served by trains on the East London Line of London Overground, when the extension from Surrey Quays to Clapham Junction is

completed. Funding for this final stretch of line was approved by the government in April 2009 (see chapter 3.4).

London has no main, central station in the same way as Berlin, although parallels are sometimes drawn between Berlin Hauptbahnhof and London's St Pancras International station, which is now the terminus for both Eurostar and high speed domestic trains. Many larger London stations are currently undergoing major programmes of improvements to facilitate access and increase capacity in a similar way to the key interchange stations on the Berlin network mentioned above. On the third rail network, major improvement works are taking place at both Blackfriars and Cannon Street mainline and underground stations. At Blackfriars, the work is in connection with the major programme of capacity enhancements being carried out as part of the Thameslink 2000 programme. The platforms of the main line station have been extended, to be able to accommodate 12 car trains, and it is the first station in London whose platforms actually straddle the Thames. A new footbridge and lifts have been installed, so that each platform has step free access and similar rebuilding work including new lifts has been carried out at the adjoining underground station. The mainline terminus at Cannon Street is also benefiting from considerable accessibility improvements, with the installation of lifts and a new passenger footbridge. Work to completely rebuild London Bridge station is scheduled to commence at the end of 2012, which will involve major upgrades to the platforms, track alignments and signalling as an integral part of the Thameslink 2000 programme. A key aspect of this work is to ease the renowned bottlenecks through the myriad of junctions in the area, most notably Borough Market junction and one of the new railway bridges has already been

lifted into place spanning Borough High Street. The work is scheduled to be completed by 2017.

As a means of drawing the historical background part of this chapter to a succinct close, a table summarising the key historical developments in both Berlin and London has been inserted below.

TABLE 1.2 KEY HISTORICAL DEVELOPMENTS IN BERLIN AND LONDON

EVENT	BERLIN	LONDON
CURRENT POPULATION (MILLIONS)	3.44	7.75
OPENING OF FIRST UNDERGROUND RAILWAY	1902	1863
1920s	CITY HAS A HIGHLY DEVELOPED TRANSPORT NETWORK, WHICH IS UNDERGOING A MASS PROGRAMME OF ELECTRIFICATION OF THE BUSY SUBURBAN LINES	CITY HAS A HIGHLY DEVELOPED TRANSPORT NETWORK, WHICH IS UNDERGOING A MASS PROGRAMME OF ELECTRIFICATION OF THE BUSY SUBURBAN LINES
CREATION OF UNIFIED TRANSPORT BODIES	BVG (BERLINER AKZIENGESELLSCHAFT) CREATED IN 1929	LPTB (LONDON PASSENGER TRANSPORT BOARD) CREATED IN 1933, SUPERSEDED BY LONDON TRANSPORT (LT) IN 1948
FORMATION OF CURRENT TRANSPORT BODY	BVG (BERLINER VERKEHRSBETRIEBE) 1 JANUARY 1992	TRANSPORT FOR LONDON (TFL) 3 JULY 2000
ATTAINMENT OF 100 % LOW FLOOR BUS FLEET	2008	2005

SOURCES:
Population Berlin: Amt für Statistik Berlin Brandenburg (2011), Mikrozensus 2009,
http://www.statistik-berlin-brandenburg.de/BasisZeitreiheGrafik/Bas-Mikrozensus.asp?Ptyp=300&Sageb=12002&creg=BBB&anzwer=2
last accessed Friday 22/04/2011.
London: TfL (2011A), section 5.2, p.125 and Census 2001
http://www.statistics.gov.uk/census2001/profiles/commentaries/housing.asp
Last accessed Sunday 24/04/2011.
Historical data for Berlin derived from Hardy 1996A and 1996B and Fabian 2000.
Historical data for London derived from Barker and Robbins 1974.

1.3 ACCESSING PUBLIC TRANSPORT

After having explored the historical development of the public transport networks of Berlin and London, which help explain some of the key differences in the differing levels of access to the networks in both cities, it is now necessary to examine in far greater detail, the theme of accessibility, which is the central focus of this thesis. The remainder of this chapter will concentrate on defining the concepts of accessibility and disability through a literature review, which will discuss both common accessibility measures found in more general literature which are worthy of further investigation and then more specific indicators used to measure accessibility e.g. the TfL indicator Public Transport Accessibility Levels (PTAL) and its successor Access to Opportunities and Services (ATOS). Some of these indicators have been further analysed statistically in SPSS using the MiD 2002 and NTS 2002-2008 data sets. Commentaries on the key crosstabulations and findings are contained in chapter 4 and the associated numerical data can be found in appendix A of this work.

The indicators demonstrate such factors as service frequency, the distribution of stops within a catchment area and the access/egress time from particular stops

to places of employment or interest. They tell us very little however about the physical accessibility of the stops, and the ease of boarding and alighting from the vehicles for various groups of mobility impaired passengers. This includes not only people with a physical disability or sensory impairment, but also parents with children in prams/buggies or with large amounts of luggage or shopping trolleys etc. The chapter examines how these fundamental issues are dealt with in Berlin and London, as well as the EU in general, and discusses what can be done to improve the situation further.

In addition to the general definition of accessibility used throughout this study and quoted above, the following more specific definition of accessibility with regards to disability will be adopted from here on, derived from TfL (2007). "When we use the word accessibility, we're referring to the ease with which people can use the Tube safely and independently, regardless of disability, age or encumbrance. (…) The Social Model of Disability, which accepts that:
Disability is a social phenomenon. It is created by society's response to a person's impairments or learning difficulties. Discrimination against disabled people is just as oppressive as discrimination on the grounds of ethnicity, gender or sexual orientation." (TfL 2007 p.6-7).

As a starting point a summary table of key figures concerning accessibility to the public transport networks of Berlin and London has been compiled below.

TABLE 1.3 VEHICLE AND STATION ACCESSIBILITY IN BERLIN AND LONDON

PERCENTAGE OF BUS FLEET WITH LOW	BERLIN 100%	LONDON 100%

FLOOR ENTRY		
PERCENTAGE OF LIGHT RAIL FLEET WITH LOW FLOOR ENTRY	BERLIN 40%	LONDON (INCLUDING DLR) 100%
NUMBER OF STEP FREE STATIONS	BERLIN S-BAHN 149/168 (89%)	SURFACE RAIL (WITHIN GREATER LONDON) 103/333 (31%)
NUMBER OF STEP FREE STATIONS	BERLIN U-BAHN 92/173 (53%)	LONDON UNDERGROUND 65/270 (24%)

SOURCES:
Figures for Berlin S-Bahn obtained from: http://www.s-bahn-berlin.de
Figures for Berlin U-Bahn/Tram/Bus obtained from http://www.bvg.de
Figures for all London modes taken from TfL(2011A).

SAMP (2005) conducted by TSG describes very succinctly what accessibility is and how it applies to public transport. “Accessibility is a concept used in a number of fields such as transport planning, urban planning, geography and marketing. Although ‘accessibility’ is a well-established concept in the disciplines of geography and urban economics, it is a fairly new concept for many transport practitioners.” (SAMP WP1 p.4).

Accessibility goes beyond physical access to the stops and vehicles and destinations served from a particular access point and extends into areas such as social exclusion. They cite seven different types of what they term as transport exclusion, which prevent people from getting out and about as easily as others. These include spatial: the location where people live with relation to the location of where they need to go. This might include longer walking distances to their nearest bus stop/railway station or the lack of through journey opportunities and the need to change en route.

Temporal: the inability to make a journey early in the morning, late at night or at weekends due to infrequent or no services. This can prevent people from being

able to take up certain types of employment, especially when they involve shift work.

Personal: where people are virtually housebound either through a physical or psychological impairment which greatly reduces their mobility, or through fear for their own safety and wellbeing when making a journey.

Financial: where the costs of making a journey are disproportionately high compared with their income. A typical indicator of social exclusion is low income (see Lucas 2012). This is a particular problem for many disabled people, due partly to their greater reliance on expensive modes of transport such as taxis and to the fact that they are more likely to be unemployed and thereby on a low income (see Disabled Rights Commission (DRC) 2000). “In other words, accessibility problems are not just caused by poor transport planning and co-ordination of services, but are also related to the location and delivery of key activities and the ways that people reach them.” (SAMP WP1 p.49).

Geurs van Wee (2004) analysed the difficulties in defining and evaluating accessibility from the point of view of land use and transport policy. “However, accessibility is often a misunderstood, poorly defined and poorly measured construct. Indeed, finding an operational and theoretically sound concept of accessibility is quite difficult and complex.” (van Wee p.127).

They continued by offering their own definition of accessibility with relation to public transport and proposing an interesting and subtle differentiation between the terms access and accessibility, which in their view are often used

interchangeably. “Focusing on passenger transport, we define accessibility as the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s). Furthermore, the terms ‘access’ and ‘accessibility’ in the literature are often used indiscriminately. Here, ‘access’ is used when talking about a person’s perspective, accessibility when using a location’s perspective.” (van Wee p.128).

Geurs van Wee cited four separate components of accessibility, which represent important practical measures of levels of accessibility to public transport and are similar in nature to the seven elements of transport exclusion highlighted in TSG SAMP (2005). They include the spatial distribution of jobs, shops and other facilities and the demand for these services at origin locations i.e. where people live and their ease of access to local services. The time required to make journeys on public transport including walking time to the stop, waiting time and in vehicle time, as opposed to how much time each individual has to make the journey to their chosen destination.

Handy and Niemeier (1997) concur with both SAMP from TSG and Geurs van Wee when determining the various definitions and measures of accessibility. They too mention such critical factors as spatial distribution of potential destinations and the ease of reaching them by public transport and the costs incurred when travelling. The lower the expenditure per trip, the greater number of trips which can be made on a given budget. Travel choice is connected to the element of cost i.e. if there is a choice of modes to make a particular journey i.e.

bus and train, then the user can select the mode which best suits their needs. There may well be some simple trade offs between time and money, which will influence their final choice of mode. They conclude by stating that “Accessibility is thus determined both by patterns of land use and by the nature of the transportation system, although two people in the same place may evaluate their accessibility differently, as wants and tastes vary.” (p.1).

One of the major problems appears to be translating complex accessibility indicators and measures into tangible and easily comprehensible outputs for transport planners and policy makers to respond to and duly act upon. Geurs van Wee concluded that there is currently no easy transaction between theory and practice. “[…] There is no guaranteed or easy transition from accessibility research to the formulation of public policy and its implementation; public policy on accessibility will only be forthcoming if accessibility is a well-politicised issue.” (van Wee p.130). This view was also shared by Handy and Niemeier who concluded that “No one best approach to measuring accessibility exists; different situations and purposes demand different approaches. (…) As the complexity of such measures increases, however, the cost of calculation and the difficulty of interpretation increases as well.” (Handy and Niemeier p. 7).

ACCESS INDICATORS AT NETWORK LEVEL

TfL (2008) detailed the Public Transport Accessibility Level (PTAL) and Public Transport Accessibility Indicator (PTAI) access indicators to public transport. “PTAL is a measure of public transport accessibility reflecting such things as: the access time (by walking) from the point of interest (POI) to public transport service access points (SAPs), e.g. bus stops or stations within a catchment area, the number of different services, e.g. bus routes or train services operating at the SAPs and the levels of service (i.e. average waiting times, with an adjustment for the relative reliability of different modes).

These components are then used to calculate an accessibility index (PTAI) which is allocated to bands corresponding to Public Transport Accessibility Levels (PTALs). Bands 1a and 1b correspond to ‘very poor levels’, bands 3, 4 and 5 correspond to ‘a moderate level’, bands 6a and 6b correspond to an ‘excellent’ level of public transport accessibility and band 0 refers to ‘areas where there are no public transport services within the specified catchment area.” (TfL 2007 p.61).

This is a useful indicator, which takes account of the most important issues when analysing access to public transport at the network level. The distance to the nearest stop or station is ideally not more than around 400 metres from the place of work or home. This represents around a 5 minute walk for most people, assuming an average walking speed of 80 metres per minute (see chapters 4.35 and 4.36). Reliability and frequency of service have a major bearing on how attractive the public transport mode is for its customers to use, and whether

the routes which serve their nearest stop or station offer them direct connections to places of importance or interest, i.e. if they live within easy access of a major north - south rail/underground/bus route, but their nearest convenient shopping centre is located to the east or west, then the accessibility of that shopping centre by public transport would be very poor from the point of view of the user. This would probably cause them to use an alternative, more convenient mode to access it, e.g. private car.

Darrall (2007) identified two other weaknesses of the PTAL indicator. They are firstly that PTAL does not take into account linked trips and secondly it uses arbitrary cut-offs to exclude more distant service access points, which duly underestimates the ability to access locations just outside those cut-off distances (see Darrall 2007 p.3).

The shortcomings of the PTAL indicator listed above led TfL to develop a new indicator, Access to Opportunities and Services (ATOS). This quantifies levels of access to such things as places of work and education, health and leisure facilities and shopping and town centres by both public transport and walking, which was not included at all in PTAL. “The ATOS-based indicator at the London-wide level is to be updated on a 3 year cycle, to reflect the pace of strategic change in London’s transport and service infrastructure.” (TfL 2011A p.169).

Berlin has a similar measure of accessibility with regard to the number of people who live within a certain distance of their nearest public transport stop. There are two main bands for accessibility. The first is that 80% of the population live

within 300 metres of their nearest public transport stop or station, and the second is that 96% of the population live no more than 400 metres from their nearest public transport service (see BVG 2007B, Reinhold 2008 and chapters 3.5 and 4.35).

Bagge (2008) discussed how the need to make public transport accessible and affordable to all Berliners is enshrined in transport policy and planning in Berlin. This is particularly important when you consider that only around half of the households in Berlin actually own a car and are therefore very reliant on the provision of good public transport services to cater for their individual mobility needs. This duly allows them to be able to work, socialise and play an active role in society and helps minimise social exclusion (see Lucas et al. 2001 and Lucas 2012). “The implementation of transport policy can make an important contribution to improving housing quality and quality of life in disadvantaged areas and provide opportunities for participation in society and the integration of disadvantaged sections of the population. This is the very challenge which transport policy has set itself in Berlin.” (Bagge p.1).

ACCESSIBILITY ON AND OFF THE VEHICLES

The necessity for making public transport accessible to all is stated very succinctly by Whitelegg (1998). He outlines the enormity of the task, which still lies ahead to achieve this fundamental aim. “In many developed countries it is still normal to find buses with steps, railway stations with many changes of level and underground systems that are unfriendly particularly to the elderly and disabled. A sustainable transport system has to be equitable and accessible to all groups, if it is to play a full role in minimising the demand for motorised transport.” (Whitelegg p.136).

Different groups of mobility impaired passengers have different needs however with regard to accessibility at stations and on the vehicles themselves. Wheelchair users need level access to the vehicles and a large, wide, clear space near the doors of the vehicle, to enable them to board and alight independently and without unnecessarily inconveniencing fellow able-bodied passengers. Visually impaired passengers on the other hand often find it useful to have grab rails located near to the doorways of vehicles, as it gives them something tangible to hold onto and orientate themselves with when finding a seat. These are just two of several, separate examples of accessibility issues, which have to be addressed when trying to provide a network which is truly accessible to all its potential customers.

Balcombe et al. (2004) highlighted some of the physical barriers, which prevent those who are most reliant on public transport for getting around from using it easily. One of the first problems encountered is the gap between the kerb or the

platform and the vehicle itself and the step/steps into the vehicle and they described how these barriers are now being overcome by such technical innovations as low floor vehicles. “A low floor bus has a single step of around 320mm. Furthermore, on some low floor buses, when the bus is stationary the suspension can be lowered to make the bus ‘kneel’ 240mm from the ground. It is also possible to extend a wheelchair ramp from beneath the floor (although as this takes time, it is at the driver’s discretion at each stop).” (Balcombe et al. pp.203-204).

TfL (2011A) detailed the current situation concerning the provision of level access to the vehicle at all bus stops in London. “As at March 2010, 50 per cent of the 17,600 bus stops in London were fully accessible (i.e. appropriate vehicle stopping controls, 100mm or greater kerb heights and no other boarding/alighting impediments). Of these, 2,200 are on the Transport for London Road Network (TLRN) and 15,400 are on borough roads. 61 per cent of the TLRN stops are fully accessible, as are 48 per cent of those on borough roads.” (TfL 2011A pp172-173).

The bus fleets in Berlin and London have been 100% low floor since 2005 (London) and 2008 (Berlin). There is still often a gap between the kerb and the vehicle, which, depending on its height, can make it more difficult or virtually impossible for people in wheelchairs, or parents with pushchairs to easily board the bus. This is most often caused by the bus being unable for whatever reason to pull in close to the kerb. Low floor buses also have a specially designated area for the exclusive use of wheelchair users or parents with pushchairs etc.

as it prevents them from otherwise blocking the aisles and hindering passenger flows on to and off the vehicle.

SAMP conducted by TSG examined in detail the various accessibility issues faced by different groups in society in the deprived area of Tower Hamlets in east London. One of the conclusions drawn from this was that equipment such as wheelchair ramps on buses was quite often not working, or the bus driver refused to operate it, especially if he was running late or if the bus was particularly busy. This issue was often further compounded by there being no clear guidance as to how many people with buggies/shopping trolleys/wheelchairs were able to fit on the bus. Some drivers would allow three buggies on, provided that one was folded up, whereas other drivers would only allow one on. These inconsistencies in customer service often left many people either waiting at the stop for the next bus or seeking alternative methods of making their journeys. It was strongly felt by many of the participants in the research that more thorough staff training in disability awareness and access issues, together with clearer guidelines for the carriage of buggies/wheelchairs, would all help to standardise the treatment and overall journey experience of these groups of passengers. It should be pointed out that there have doubtless been some significant improvements in all of these areas, e.g. in driver training, in London since the study took place in 2005.

In autumn 2011, BVG announced that it wanted to discontinue the practice of automatically lowering the wheelchair ramp at every bus stop, as it was allegedly leading to a higher failure rate of the ramp mechanisms, together with increased dwell times at stops. They proposed instead adopting a similar

practice to that already in existence in London, i.e. the lowering of the ramp has to be requested either by pressing a button on the vehicle or by directly speaking to the driver on arrival at the stop. Concern has been expressed by a campaign group of wheelchair users in Berlin, that many bus drivers may be inclined to state falsely that the ramp on their vehicle is defective, to avoid having to deploy it to facilitate the mobility impaired passenger to board the vehicle. It is as yet too early to deduce whether their fears are in any way founded.

As far as light rail is concerned, London is currently ahead of Berlin, having 100% low floor vehicles on London Tramlink and 100% level access between the platform and the trains on the Docklands Light Railway (DLR), whereas in Berlin only around 40% of the current tram fleet is low floor. There are still many old high floor Tatra trams in operation in Berlin, which have several steps up into them and are thus inaccessible to many different groups of mobility impaired travellers. These are gradually being replaced by the next generation of low floor tram known as the ‘Flexity Berlin’, built by Bombardier, and the withdrawal of all of the Tatra trams is scheduled to be complete by 2017.

The gap between the platform and the train at most S-Bahn and U-Bahn stations in Berlin is fairly minimal and so step free access is not normally a problem, although this does vary slightly depending on the type of rolling stock forming the service. Each station is equipped with a ramp at the end of every platform. The train operators have keys to unlock these, and if required for boarding, they can then unfold them and position them in place, to facilitate the wheelchair passenger to board through the first door into the leading carriage of

the train, before replacing them and locking them back into position, to prevent damage or theft. The driver asks the passenger where they wish to alight, and again, if required, can assist with this by the use of the ramp. There are still some suburban trains however, which have steps up into them, but these are due to be replaced by DB over the next few years.

Unlike in Berlin, there is often a sizeable gap between the platform and the train on most lines of the London Underground and there are no portable ramps available at the stations. It is hoped though that portable ramps, which were deployed for wheelchair users during the Olympic and Paralympic games on the London Underground, may be retained at certain main interchange stations for future use. The only exceptions to the above are on the Jubilee Line extension and, as previously mentioned, the Docklands Light Railway, where level boarding was incorporated into the platform design and construction of both of these networks from the outset. Platform humps are being added at most of the Victoria Line platforms to facilitate step free access to the new 2009 stock trains and a similar programme of either platform humps or adjusting the heights of the platform edges is due to be rolled out over the subsurface lines during their phased programme of significant upgrades, including the introduction of the new S7 and S8 stock trains between 2010 and 2017 (see TfL 2011A and 2011B).

Most suburban trains in London also have quite a high step into them, although there is only one step rather than the two or three steps often encountered on some older regional trains in Berlin and Brandenburg. The majority of larger stations in Great Britain have portable ramps to allow wheelchair users to board

and alight from trains. This facility often has to be booked a minimum of 24 hours in advance of travel and is not 100% guaranteed due to such factors as staff shortages and communication breakdowns between the telephone booking line and the station staff.

This is often a cause of intense dissatisfaction amongst disabled people, who are wholly reliant on staff assistance to board or alight safely from trains. They feel that they receive a substandard service compared with other customers and that transport providers should have the capacity to be flexible enough to deal with these situations when they arise. Lucas et al. (2001) reported that some individuals who require assistance often refuse to give the stipulated 24 hours notice to use the trains, as they consider it illegal and immoral. DRC (2000) mentioned a common phenomenon which I personally have experienced, i.e. when people do go through the correct channels to book assistance for their train journey, the service has failed to be delivered on several occasions, as miscommunications have meant that staff have not been in the right place to meet the disabled person. Disabled people have also been let down when their services have been late or have been rerouted and they have arrived at a different destination, as this information is not relayed to the relevant staff and they are left stranded and have to rely on the goodwill of fellow passengers.

1.4 DEFINING DISABILITY

The PTaccess project (2009) was an EU-wide study to investigate the various issues surrounding accessibility to public transport in several EU countries and how this is related to such themes as social integration, independent travel, employment prospects, social exclusion and isolation.

The PTaccess project stated that one of the major issues it faced with undertaking such an EU-wide study was obtaining comparable, statistical data on disability, because there are so many definitions of the term disability within the countries of the EU, and no one definition was universally applicable. There were also many discrepancies concerning people's perception of the safety aspect of public transport within the EU countries, some of which (although not Germany or Great Britain, focussed on in this thesis) considered public transport to be dangerous and would actively discourage disabled passengers from using it unescorted.

A further difficulty encountered was the lack of detailed data about the numbers of disabled people and their specific disabilities in each of the 25 EU member states surveyed, which necessitated a large degree of sensible estimation and educated guess work. "The definition of 'people with disabilities' varies across the member states. Therefore the 'number of inhabitants with disabilities' given for different member states cannot be compared! (e.g. the stated share of people with disabilities varies between 2.24% in Malta and 40.4% in France." (PTaccess report 1.3 p.12).

The figure for disabled people given for Great Britain is 17% out of a population of 60.7 million which equals 10.32 million. The figure quoted for Germany is 8.25% out of a population of 82.3 million which equals 6.79 million, i.e. Germany appears on the surface to have a larger population, but with a smaller number of disabled people. This may have been caused by differing definitions of disability used in Germany and Great Britain. The disabilities included in the PTaccess survey were defined as: motor impairment, visual impairment, hearing impairment, cognitive/ learning impairment and functional Illiteracy (as listed in table 3.1 of PTaccess report 1.3 p.12).

One thing that was common across the sample of countries was that public transport stops and stations were generally much more accessible in urban areas, as opposed to suburban and rural areas. The report then went on to say that “In most countries accessibility issues are only taken into account, when stops and stations are newly constructed and when existing stops are refurbished. The results showed that the existing stops and stations are not sufficiently accessible for people with disabilities.” (PTaccess Report 1 p.2).

This would certainly seem to be true in London. Stations are being made more accessible for disabled passengers, but only during planned upgrading or refurbishment work. This often includes renovation or installation of lifts, laying of tactile markings along the platform edge and at the start and end of steps, and audible announcements on the platforms giving the destination of the next train. In Berlin similar accessibility improvement work is carried out during planned station refurbishment and BVG is aiming to make its whole network step free and accessible at some point in the future (see chapter 2.5 and

appendices B and C). Although TfL has no similar target for its networks becoming fully compliant, TfL 2012 stated succinctly that all 270 underground stations will be equipped with the tactile strips along the platform edges by the end of 2013.

LEVELS OF AUDIBLE INFORMATION

The iBus scheme introduced in London in 2008 has helped to make the bus network far more user friendly, especially to those with a visual impairment. It provides passengers with automated, audible announcements about the route number, final destination and the name of the next bus stop. The announcements are played at regular intervals, usually just after the doors open at each stop and the name of the next stop is also announced just prior to arrival there. Automated audible announcements on buses in Berlin have been a common feature for many years now, but they are far less detailed than those in London. The name of the next stop is announced prior to arriving at it, but there are no repeat announcements regarding the route number and final destination when the doors open at stops.

The same levels of information are usually given on Berlin trams, although the new Flexity Berlin vehicles do announce the route number and end station when the doors open at each stop. This is very useful for people who are unable to read the optical displays in the vehicle, especially as communication with the driver is very restricted on the trams. The Flexities are also fitted with audible door locators, which emit a short beep every few seconds whilst the vehicle is stationary at a stop and the doors are activated. All London Tramlink

trams announce the next stop prior to arrival, repeat this information when the doors open at the stop, and also speak the end destination of the tram and the next calling point prior to the doors closing and the tram departing.

On the Berlin U-Bahn, the name of the next station with any interchanges is announced prior to arrival and once at the station, the end destination but not the line number is spoken (see chapter 2.6). Similar automated announcements have featured on S-Bahn rolling stock in Berlin for several years, whereas their introduction to the London Underground has been a more recent development. On most trains of the London Underground, the next station is announced with interchange possibilities where applicable, and this is then repeated at the station itself, often together with the line name and the final destination of the specific train.

Almost all of the suburban electric multiple units (EMUs) operating on the third rail network south of London are now equipped with automated announcements, which give a very similar level of detail to that described for London Underground. The same also applies to London Overground and the Docklands Light Railway.

On the Berlin S-Bahn only the name of the next station with interchange possibilities is announced before arriving at that station. This information is not repeated at the station, but the names of the next three stations together with the line number and end destination of the train do appear on the optical display. This is one example where levels of audible and optical information vary considerably. The end station of the train is usually announced by either

the platform dispatcher or the driver himself at unstaffed stations, but this is sometimes quite difficult to decipher, especially if you are unfamiliar with the language.

There are many other common variables with audible information systems, which the disabled traveller has to be aware of when out and about on the move. Firstly there is the fact as to whether they are actually switched on and working accurately or not. I have been on several trains mainly on the London Underground, where the announcements have not been working at all or have been switched off for whatever reason. Alternatively there are still instances where the audible announcements are either ahead or behind the actual location of the vehicle. This still seems to be a fairly regular problem with iBus in London, especially if the vehicle has been diverted at short notice and has subsequently caused me and other visually impaired friends of mine to exit the vehicle at the incorrect stop. Both of these difficulties can still make wholly independent travel extremely challenging for disabled travellers, especially if they are unfamiliar with the local area.

Secondly there is the volume of the announcements and the level of ambient noise in the vehicle, both of which can vary quite considerably. Two common scenarios often occur; either that the noise level onboard is high from other passengers, the air conditioning or general noise from the motion of the vehicle and the volume of the announcements is comparatively low, so its effectiveness is minimised, as it’s so hard to decipher the information being spoken. This is most acute at peak times on the London Underground. Alternatively, the noise levels on the vehicle are modest bordering on low, but the volume of the

announcements is comparatively loud. This tends to become a constant irritation to everyone, including those people for whom the announcements are supposed to benefit. This is because visually impaired people usually have a far more acute sense of hearing and therefore do not need the information to be broadcast at high volume.

These mismatches of need and expectation can make the travelling environment at best quite irritating and at worst rather unpleasant. It can also cause an increase in customer complaints, either to the driver of the affected vehicle or to the transport operator. This can in turn lead to incidents of the audible information systems then being switched off altogether or reduced to a very low volume as previously mentioned, and thus render them virtually useless by any passengers, who may be wholly reliant on that information.

In my personal experience, all the aforementioned scenarios seem to be more likely to occur in London, but rarely seem to happen in Berlin. BVG and the Berlin S-Bahn seem to have far better standardisation of providing onboard audible information, which benefits all of their passengers.

It could be argued that a really useful refinement to these systems would be the ability to vary their broadcast volume automatically, to compensate for the current amount of ambient noise. I.e. when a train is in a tunnel section, the announcements do need to be louder than they would be on a straight open stretch of continuously welded rail. It is essential to establish a happy medium between such systems being extremely effective and useful for those who are reliant on them, and them being rendered useless or a source of stark irritation

to everyone onboard the vehicle and merely adding to noise pollution (see Horncastle 2009).

1.5 STAFFING LEVELS AND AWARENESS TRAINING

According to the PTaccess project, most disabled passengers in Germany consider travelling by public transport to be safe. Concern has been expressed however at the reduction in the number of staff, especially on the national DB network over recent years, as a result of cost cutting measures. ”The customer service was believed to be declining. More and more stations do not provide an attended desk in smaller stations. Ticket counters and luggage storage is often not accessible.” (PTaccess report 1 p.50).

Another issue appears to be staff awareness training, which was also highlighted by people in London, participating in the TSG SAMP. Many German staff feel unable to deal with disabled travellers whenever the need arises. “(…) there is still a fear of contact between the people working at public transport operators and people with impairments. However, there is a clear improvement - particularly with younger people who seem to have fewer problems and are more motivated to help. But there is also a stronger self-confidence of people with impairments, which also helps for a better communication.” (PTaccess report 1 p.50).

I witnessed firsthand a prime example of the unwillingness of staff to help during my journey across Berlin with experienced wheelchair user Corinna Lichtenberg. At one point we had to board a tram at a temporary stop, located

on the wrong side of the tram lines. The tram which arrived was a low floor vehicle, but the wheelchair ramp was on the other side. The driver just remained in his cab, window closed, mouthing and gesturing something through the glass at Corinna, before closing the doors and pulling away. The next tram was a Tatra which was completely inaccessible anyway. The third vehicle was luckily another Siemens low floor tram, with a far more helpful driver, who helped Corinna move across the rails to the other side of the tram, before opening the door, deploying the ramp and allowing her to board. Alighting at our chosen stop was much easier, as the ramp was then on the correct side of the vehicle to facilitate this.

1.6 ANTI-DISCRIMINATION LEGISLATION AND CONCESSIONARY FARES

Germany and Great Britain both have anti discrimination laws, which apply to transport. The ‘Allgemeines Gleichbehandlungsgesetz’ is a national anti-discrimination law in Germany which came into effect in 2006. The regulations regarding the accessibility of public transport are mainly at a federal state level, although there are also regional regulations which include general guidelines for the level of accessibility.

“Accessibility is increasingly becoming a major topic on the political agenda, mainly because of the growing number of legal frameworks. (…) However, the law is quite weak and key standards are partly missing. (…) There is no monitoring conducted although there is a discussion if the federal agency for railways (Eisenbahnbundesamt) should monitor their accessibility. The disabled groups have the opportunity to take railway operators to court if the new

stations do not meet the requirements (e.g. lift instead of stairs).” (PTaccess report 1 p.115).

Transport operators receive a payment from the German government to cover concessionary fare schemes just as in Great Britain. Disabled people themselves can also choose either to receive a discounted rate for their car tax or a concessionary disabled pass ‘Schwerbehinderterausweis’, which entitles them to free travel on local public transport within a radius of 50 km. In addition they are entitled to a 50% discount when travelling on German national railways, when they are also in possession of a valid railcard, which they do have to purchase at the normal price.

Disabled visitors to Berlin do not have such permits and so are obliged to purchase tickets just like any other travellers. These are available from automated machines at bus and tram stops, on S-Bahn or U-Bahn station platforms, or from fully staffed ticket offices at larger stations and from all BVG bus drivers. A new generation of ticket machines has recently been introduced at every S-Bahn station and these include such accessibility features as Braille markings on some of the keys, a bigger, brighter, backlit screen with adjustable colour contrast and font size for people who are partially sighted, induction loops for the hearing impaired, which can be used when communicating with someone in the help centre at the press of just one button. They also have multi-lingual functionality and are reported to have synthetic speech output as well, to assist the totally blind in using them. On closer examination of at least three separate examples of these new vending machines during a field trip to Berlin in October 2010, none of them appeared to have any form of audible

output. Ideally this function should be switched on by default, as otherwise it would be very difficult for a blind person to be able to select the appropriate option to activate speech before then being able to use the machine. Even when the chosen ticket has been purchased, it still needs to be correctly stamped in another machine to be valid for travel; failure to validate it correctly may well result in a fine being received for unauthorised travel, in the same way as travelling without a ticket at all. Even if you purchase a ticket from a staffed ticket window, they are unable to stamp it for you there and so you are still often reliant on total strangers to carry this out for you on the platform. The only way which you can currently guarantee that your ticket is correctly validated is to purchase it from the driver of a BVG bus. Their ticket machines automatically stamp and validate the ticket before it's issued.

Purchasing a ticket and travelling legitimately when visiting Berlin as a visually impaired person is far more difficult than is the case for foreign visitors to London. BVG plan to introduce an online web shop, where tickets can be purchased in advance and sent to you prior to your arrival in Berlin. They have also announced the gradual replacement of all their ticket machines with a new more accessible generation similar to those recently introduced on the S-Bahn network, but neither of these measures tackles the problem of being able to correctly stamp your ticket once purchased. If staffed ticket windows also had validators, then this would be one relatively simple solution to this problem.

When this matter was raised during my interview with Bettina Jeschek (BJ) and Angelika Simon (AS) from the Berlin S-Bahn, they provided the following response. AS: "I don't have a definitive answer at the moment, but this is

something which I'll take away from our meeting today and hopefully we'll be able to come up with a solution in the coming months. I must say that this is something which will have to be referred to the VBB as a whole, as we are only one transport operator within this network. We couldn't introduce changes to the validation of our tickets without BVG and the other operators in VBB doing likewise." (appendix C p.240).

Great Britain has similar anti-discrimination legislation to Germany. There are several different regulations, which deal with accessibility to public transport. The main act is the Disability Discrimination Act DDA (1995 and 2005), which was subsequently superseded by the Equality Act 2010. The other main piece of legislation concerned with access to public transport is the EU-wide Technical Specification of Interoperability relating to Persons of Reduced Mobility (PRM-TSI 2007) (see Horncastle 2009).

The Department for Transport (DfT) is responsible for implementing those parts of the acts which have a direct impact on transport services. A degree of co-operation also exists between the government and the multitude of organisations representing people with different disabilities. The three main objectives of stakeholders with regard to access to public transport are listed in the PTaccess report as: "funding (ageing infrastructure); attitudes of staff (difference between the attitudes of managers and operational staff); lack of direct control (rail and bus are privatised)." (PTaccess report 1 p.197).

The PTaccess report continued by saying that most complaints from disabled travellers are not about the transport service itself, but rather about poor staff

attitudes, a theme reiterated by the TSG SAMP in the London borough of Tower Hamlets. This is something which can hopefully be gradually eradicated by improved staff equality training in both Berlin and London.

The greater staff presence in London is very reassuring to disabled travellers, especially those who are unfamiliar with the system. They are on hand to answer queries, assist with purchasing tickets if necessary, and can usually escort passengers to their train and arrange for a colleague to meet them at their destination station and help them with their onward journey. This comprehensive service cannot always be provided for a variety of reasons, but in the majority of cases it is available without the necessity of booking a minimum of 24 hours in advance. This is the minimum period of notice stipulated by the various train operating companies when using the UK national rail network, or by similar schemes offered by DB in Germany (see Lucas et al. 2001).

1.7 OVERCOMING THE BARRIERS TO ACCESSING PUBLIC TRANSPORT

The second working paper from the PTaccess report highlighted areas of good practice in accessibility to public transport already implemented in the EU countries surveyed. The report detailed the “Barrierefrei” (barrier-free) label, which is awarded in Germany to various public places including stations, which meet certain levels of accessibility and ease of use, stipulated in German law. The first station to receive such an accolade in July 2007 was Pankow, a busy S-Bahn, U-Bahn and tram interchange station in the east of Berlin.

“The new label ‘barrier free’ was developed through close co-operation by several institutions from the economic sector, trade, tourism, culture and science. (…) The label contains a white arrow on a light yellow background and signals a quality standard to people with disabilities. (…) In the case of public transport that means stations must be stair free and accessible by elevators or ramps. It also means the elevators need to have a voice system, a tactile operating system approximately 85 cm high, and a navigation system with contrasting optimised and tactile guidance for visually impaired people at all platforms, at the exits and at the elevators.” (PTaccess report 2.1 p.41).

During a study visit to Berlin in October 2009, a small, personal audit of levels of access to a sample of S-Bahn and U-Bahn stations, some of which already had the label barrier free was undertaken. One of the most striking outcomes was that although many of these stations had lifts to and from the platforms, not all of them had audible announcements/tactile markings on the buttons themselves. Others had these, but some of the Braille or tactile markings had been removed or damaged. There appeared to be a lack of consistency as to the layout of the buttons and their respective markings in the lifts, even between stations which were already termed as barrier free. Christine Albrecht, Head of Accessibility at BVG responded to these observations by saying: “I know, but as I said, the programme began about twenty years ago and the demands of our passengers have grown and changed considerably in that time and continue to do so. It has to be a compromise at the end of the day.” (appendix B p.235).

Realtime information about the status of lifts at barrier free stations is listed on the BVG and Berlin S-Bahn websites, as well as those of some local radio

stations, which also broadcast a summary of the latest information in their principal travel bulletins throughout the day. There are also interactive maps containing details of barrier free stations, where the lifts are currently out of order, and where possible it lists alternative step free routes.

Brand new stations such as Berlin Hauptbahnhof have had many access features incorporated into their design from the outset. This fundamental aim was only realised with much consultation and collaboration between various stakeholders including DB and the local Berlin association for the blind (ABSV). A tactile navigation system has been installed in all areas of the station and is very easy to follow. “It is composed of guidance stripes that are integrated into the floor and can be sensed with the white cane. Special attention blocks made of blistered tiles in the station and of corrugated tiles on the platforms indicate stairs, elevators, intersections and changings of direction. (…) Additionally, the spoken announcements include information on the platforms that are served by the elevator and on services that can be reached. Handrails are available on each of the stairs that are included in the system. They have information in Braille and thus further ease the orientation of blind people”. (PTaccess report 2.1 p.43).

In addition to all these facilities, the local association for the blind in Berlin (ABSV) also offers mobility training to its members, so that they can learn how to make the best use of all these guidance systems in and around the station and thus move about safely and independently. They also provide a text description of Hauptbahnhof on their own website, so that blind people can familiarise themselves with the station before arriving there.

In another example cited in the report, BVG have developed a new, fully retractable mechanical ramp for their next generation of low floor Flexity Berlin trams. It's made of several sliding sections and can bridge a sizeable vertical and/or horizontal gap between the platform and the vehicle. The mechanical ramps can be operated independently by the passengers themselves and have many advantages over the electric lift in use on the current BVG low floor fleet e.g. the cost of them is about a third of that for the lifts and the maintenance cost around a half and the ramps are lighter to operate (see PTaccess report 2.1 p.44).

The Berlin S-Bahn is still striving for innovative solutions to access difficulties. In the summer of 2007, it installed the first so-called 'People Mover' at the S-Bahn station Betriebsbahnhof Rummelsburg (line S3). This is a cross between a lift and a bridge and travels both horizontally and vertically carrying passengers between the two platforms. It is used by around 5400 passengers a day and there are at least two other similar devices in use in other areas of the DB network. TfL is also striving to make the London Underground, the oldest underground network in the world, more accessible to its users. "At the stations the staff are ready to assist people in need, and there is no need to pre-book this service. All front line staff are trained in how to assist all kinds of disabled passengers as part of their disability equality training. Priority seats are being introduced on platforms and in the trains themselves, identified by signage. Tactile warning surfaces are being installed on every platform." (PTaccess report 2.1 p.78) (see chapter 2.5).

The percentage of disabled people in the population of the 25 surveyed EU countries ranged from 10% to 40% depending on the statistics, as highlighted above. This potential target group for public transport will increase in the coming years and decades, as the overall population ages. This will in turn place more pressure on public transport operators to increase accessibility to their networks further. SAMP from TSG concluded that the mobility behaviour of disabled people showed that the number of trips, and the distances travelled, were much lower than for other groups. This finding was confirmed in the crosstabulations concerning age and disability (see chapters 4.51-4.55 and appendix A). “This points to a deficiency due to an environment that has not been adapted to cater for those with mobility impairments, and means that there is still a great potential for additional public transport use provided that accessibility to public transport systems is guaranteed. In this way non-discriminatory solutions are necessary.” (PTaccess report 2.2 p.6).

There was further confirmation of the average lower trip rates by disabled people in the MiD 2002 and subsequent MiD 2008 summary reports ‘Ergebnisberichte’. In 2002 the average German made 3.3 trips per day totalling 37 km; and this increased slightly to 3.4 trips totalling 39 km in 2008. For people registered disabled and with reduced mobility the figures were considerably less; in 2002 they made on average 2.4 trips a day totalling 20 km and in 2008 this had increased slightly to 2.7 trips, but the distance travelled had marginally reduced to 18 km (see MiD 2002 Ergebnisbericht pp.153-155 and MiD 2008 Ergebnisbericht p.21 and p.86; both of which can be accessed at: http://www.mobilitaet-in-deutschland.de/index.htm).

One of the main reasons for this lower average trip rate is likely to be the greater reliance that disabled passengers have on planning their journey along a familiar route. If for any reason this route is unavailable, then they often find it far more difficult to find a suitable alternative one. “(…) disabled people only undertake a journey if they can be confident that all stages of the journey will provide reliable and compatible levels of accessibility. The concept of a seamless intra and/ or inter modal journey from door to door is very important for all people, but especially for disabled people, as they are less flexible and unable to find alternative solutions in case of a broken transport chain.” (PTaccess report 2.2 p.14).

Martin (2008) detailed the various age groups of traveller and their typical transport journey patterns in London. “More weekday trips were made by 25 to 64 year olds (i.e. the working population) than any other age group, with part-time workers making more trips than other working or non-working status groups. Wheelchair users made, on average, only 1.3 trips per day, although, as there is a correlation between age and wheelchair use, this statistic is partially a function of age.” (Martin p.6).

The lower rates of wheelchair travellers mentioned by Martin may also be attributable to widespread levels of poor accessibility at stations and on vehicles. They have particular difficulties accessing many parts of the network and are highly sensitive to such soft factors as inadequate provision of lifts or other alternatives to steps at stations, or when these facilities are for whatever reason unavailable, as well as the lack of level access onto or off the vehicles etc.

1.8 EVALUATING ACCESSIBILITY IMPROVEMENTS

Cost Benefit Analysis (CBA) which has until now been the main tool used to evaluate the success of accessibility improvement schemes, fails to take any account of the "(…) gains in the objective and subjective quality of life for the affected people by an increased quality and quantity of accessible destinations being available." (PTaccess report 2.2 p.6). This has particular relevance when analysing services such as dial-a-ride. This provides severely disabled people, who are otherwise unable to use scheduled public transport, with the opportunity to go out and integrate in society, even though the trip cost per capita of the service in London is extremely high (estimated to be around £20-£25 per journey). Other benefits arising from enhanced accessibility may also include increased independence, greater self esteem, alleviation of perceptions of loneliness and social isolation (see Lucas et al. 2001 and Lucas 2012). One of the main problems of using cost benefit analysis to evaluate such schemes is that it deals with changes in purely financial terms and thereby fails to take any account of welfare impacts and improvements to quality of life. These improvements may well be priceless in enriching the lives of many individuals, who often experience difficulties in getting out and about.

The new OBS tool (Opportunities - Behaviour - Satisfaction), developed as an integral part of the PTaccess study aims to take account of some of the soft factors concerned with improved accessibility provision on public transport. "These three terms stand for the three basic components that lay the foundation of our evaluation tool." (PTaccess report 2.2 p.37). It attempts to reflect these

benefits to people's lives, as well as taking other monetary and non-monetary effects such as environmental benefits and lower fuel consumption into account. The report details some reasons for the apparent lack of evaluation of such projects up until now.

One main reason is that measures to improve accessibility are often only undertaken in response to changes or strict enforcement of anti-discrimination or equal rights laws such as the (DDA) in Great Britain. This often means that public transport operators are awarded a pre-determined level of funding for meeting a core level of basic standards or targets in their transport provision. This might cover the purchase or lease of new vehicles or rolling stock, or for making stops/stations step free during a planned programme of refurbishment.

Another reason is that many of the projects to enhance accessibility are either pilot ones, or they make use of earmarked funds for that sole purpose. There is therefore no need to evaluate the relative merits of different measures to be implemented, because the level of funding is directly linked to the individual measure rather than to its perceived user benefits.

The third reason is that municipal authorities and transport operators understand the onus placed upon them to provide accessible and affordable public transport. They thus define their own standards based upon this obligation, many of which can prove to be rather ambitious. Once a course of action has been agreed, then no other potential solutions are considered, even if they may turn out to be more effective at delivering the desired end results, and represent better value for money than the original scheme.

Handy and Niemeier commented that an extremely important use of accessibility measures could be for evaluating levels of investment in public transport and its associated infrastructure. “Whether at a regional or local level, accessibility measures would provide planners and decision makers with a better assessment of the implications of potential investments for the daily lives of residents.” (Handy and Niemeier pp.1-2).

In Berlin just over 50% of U-Bahn stations currently have lifts (see table 1.3 above). Each subsequent station renovation, including the installation of lifts costs around €1-€1.5 million, and so the conversion of all U-Bahn stations to become step free is likely to last another 20 years or so. As a result of the need to allocate and use the funding, there is often no opportunity to weigh up and evaluate fully any other potential schemes, which may be cheaper or achieve superior results.

The report attributes the second main course of evaluation deficits to the fact that the costs of the project cannot easily be assigned to one improvement measure for public transport access for disabled people. There are also many reasons for this, but they include the fact that the measures are financed by different sources of funding as parts of larger projects, and it is thus very difficult to separate off the costs for one particular measure, e.g. contracts for purchasing new vehicles are negotiated as a package, including the specification of onboard equipment and order quantity. Another example is the repainting of train doors to improve their colour contrast and make them more

easily identifiable for visually impaired people, which is usually completed as part of a general train refurbishment programme.

A further difficulty is that different parts of the infrastructure are owned by different people, e.g. the station platforms are owned by one company, for example Network Rail, and the shops on the concourse by another. Each of the individual stakeholders will have to contribute and collaborate to make the different parts of the station barrier free and it is very difficult to disaggregate the separate effects from one another afterwards.

There are other problems which may well hinder critical and meaningful evaluation of schemes. There is often a lengthy lead time between implementing improved accessibility measures at stations and their increased usage. There also has to be a sufficient number of stations made barrier free for people to use, so that they have a good number of potential destinations to choose from when planning their journey. Disabled people have to be made aware and kept up-to-date about increased accessibility on the network. They will often need special training, especially visually impaired people, so that they can navigate around the network as independently and as safely as possible. The impacts of the improvements are usually long term, and are once again difficult to attribute to one particular measure. Even if the improvements for disabled people are clearly tangible, such improvements often benefit many other groups of travellers such as parents with young children, and these additional benefits are far harder to quantify.

People in charge of improving accessibility for public transport often try and obtain funding not just from their own institution, but from other key stakeholders as well (see the above example of different companies owning different parts of a station). They then do not appreciate the necessity of evaluation of the project once it's complete and often misjudge informal feedback from customers, to be of sufficiently good quality to shape their future decisions during the planning stage of further rounds of accessibility improvements, if any further rounds are indeed envisaged. This lack of efficient evaluation of accessibility measures means that there is no clear way of establishing whether limited funds have been usefully allocated and have represented good value for money in achieving the intended aims of the transport operator. "Decisions in the transport sector are complex, and often expensive, and there are always different alternatives that make it necessary to weigh the costs and benefits. Assessment methods enable transparent decisions. Public institutions in particular often must bring the proof of the efficient use of public money. Evaluation additionally provides the opportunity for benchmarking, to share experiences gained and to increase the knowledge base for future projects." (PTaccess report 2.2 p.10).

The evaluation of measures aimed at improving access to a public transport network would seem to be even more essential, as they are often extremely costly e.g. the installation of lifts in underground stations is usually complex, time consuming and costly. The group of obvious users and beneficiaries of such schemes is often small, representing at most 40% of the population depending on how the statistics are calculated. It must not be overlooked though, that many other groups of users also profit from such improvements at

stations, including parents with young children in pushchairs and passengers with heavy luggage. It may also attract new people to start using public transport, thereby switching from making their journeys by private car or taxi. This will benefit the transport operator by giving them an increase in their passenger numbers and subsequent revenue, and will also benefit the environment by reducing the number of cars on the road, as less special transport provision and/or taxis/minicabs will be used to complete journeys.

The report continued by describing various projects which have taken place including some different schemes in Berlin and outlines how they might be theoretically evaluated using the new OBS tool. One of these was the aforementioned upgrade work carried out at the busy S-Bahn and U-Bahn station at Pankow in the east of the city, in order to make it completely barrier free. The main conclusions drawn by the report for all the schemes however are that insufficient data has been collected up until now, and as a result of this, no firm preliminary conclusions can be drawn at the moment using the OBS evaluation tool.

1.9 CONCLUSION

This chapter has given a broad overview of the key aims and objectives of the study concerned with accessibility and to place them in their relevant historical context. The following chapter will focus on the main similarities and differences between the accessible transport policies in both Berlin and London. Firsthand insight into these policies was gleaned through interviews with key stakeholders responsible for making public transport accessible in both cities and also from speaking to mobility impaired passengers. The main similarities and differences are compared and contrasted throughout the following chapter.

CHAPTER 2

ACCESSING PUBLIC TRANSPORT

INTRODUCTION

Chapter one thoroughly explored the different definitions of accessibility and what they mean in theory and practice for both the various transport operators in Berlin and London, and for passengers with reduced mobility in both cities. This chapter is concerned with comparing and contrasting the respective attitudes and policies towards these complex issues gleaned from some extremely enlightening interviews with key representatives responsible for making public transport accessible in Berlin and London, and from some qualitative work speaking to mobility impaired passengers.

A comparative text highlighting these issues forms the basis of this chapter and full transcripts of the interviews can be found in appendices B, C and D and a list of the interview questions is given in Appendix E of this work. The main aim of the interviews was to provide a clear idea of how effective the implemented measures are at opening up the Berlin and London transport networks to as many people as possible. The key stakeholders interviewed were chosen due to their recognised expertise in the field of accessible public transport policy and provision. Although requests for interviews with all the TOCs who operate services on the third rail electrified networks of southeast and southwest London were submitted, unfortunately no responses were received in the time available. The research will also, where appropriate, draw on the author’s own

personal experiences of travelling independently in both cities as a totally blind person.

2.1 THE FUNCTION AND STRUCTURE OF THE ACCESSIBILITY BODIES IN BERLIN AND LONDON

The following abbreviations have been used in the text:

WT = Wayne Trevor, manager of the accessibility and inclusion unit of London Underground (LU) part of Transport for London (TfL).

CA = Christine Albrecht, who is responsible for accessibility for elderly and mobility impaired passengers at Berliner Verkehrsbetriebe (BVG).

BJ = Bettina Jeschek, responsible for accessibility at the Berlin S-Bahn.

AS = Angelika Simon, Head of marketing at the Berlin S-Bahn.

N.B. page references given after quotations in this chapter refer directly to the page of the relevant appendix, where the full quote can be found.

The role of the accessibility unit in TfL differs considerably from the equivalent bodies in BVG and the Berlin S-Bahn. There is far more interaction both internally between them and other TfL departments and employees, and externally with firms such as rolling stock manufacturers, than exists in Berlin.

WT: “Our role is basically twofold: the first is internally within the organisation, to help people effectively to understand the needs of disabled and other excluded groups of people. For example, it is my and the team’s role to make sure that people who are designing new trains or new stations, or refurbishing any of

these things, all those sorts of activities, that they understand what the priorities and requirements of excluded groups are." (appendix D p.243).

BVG's internal structure appears to be quite different to that of TfL. There are four community contact people, each responsible for three whole districts of Berlin or around 850.000 people. Each of these reports to the area manager Christine Albrecht, who then collates and takes matters forward to the BVG management. Her role seems to be more of an advisory one rather than having direct input and influence in key decision making. It was very surprising to learn for example that although she's heavily involved in organising a variety of open days and other events throughout the year, she'd only just been invited to attend one of these open days for disabled passengers in person. During these training sessions, they are able to practise boarding and alighting from BVG vehicles. Separate events are held for buses, trams and underground trains. She was also only there in an advisory capacity, to give out information and answer queries from attendees. Christine Albrecht reported that she has no direct input on the disability awareness training which BVG staff receive, and there also does not seem to be a clear mechanism to measure the effectiveness and evaluate the success of the disability awareness training programme. This in turn renders the task of making improvements to the training extremely difficult, whereas the complete opposite is true in London.

Christine Albrecht and her team are part of the marketing division of BVG rather than being a dedicated department for passengers with special needs and additional access requirements as in London. A similar structure to BVG is also

in place at the Berlin S-Bahn, according to Bettina Jeschek and Angelika Simon.

CA: “My four colleagues are each in charge of three districts. (…) They have the role of being a contact person for BVG and work within the community, e.g. When local politicians or members of the general public have a particular transport related issue they wish to raise with BVG, it’s often the case in such a big firm as ours, that they don’t know exactly who they can best contact to bring the matter to our attention. There are then my four colleagues, who are well known in their allotted districts and they are the contact people for any questions or issues to do with BVG. I am the area manager for the team and therefore for the whole of Berlin. I have particular responsibility for passengers with a mobility impairment (disabled and elderly people). My main role is on the one hand to explain to the customers why BVG in Berlin behaves in the way it does, and on the other hand, I relay feedback and concerns from our disabled customers to the management at BVG. As you can see, my job has many sides to it, because it deals with many different areas. I write articles for various magazines and newsletters for the disabled in Berlin, as well as for our own customer newsletters and staff journals, to keep people informed of the progress BVG is making in the accessibility to its network.” (appendix B p.228).

Such mobility days are unique to Berlin. The London Underground system is almost certainly too busy and unfortunately in many places too inaccessible to be able to offer similar training days. The transport policy adopted by TfL’s accessibility and inclusion unit and equality and inclusion unit comes partly from the government and partly from the Mayor of London Boris Johnson, who also

has direct involvement in shaping the policy, unlike his Berlin counterpart Klaus Wowereit. BVG management and the Berlin Senate ultimately shape and implement the equivalent disability policies in Berlin.

WT: “At a very detailed or micro level, we have definitions of what an accessible station or an accessible train is, but what we do at the strategic level is that we tend to talk about social inclusion and that covers a number of areas. Transport for London is one of a number of organisations that are part of the Greater London Authority (GLA) family. This also includes the Metropolitan Police and a few others. It is the GLA and the Mayor who define accessibility, social exclusion and social inclusion and those sorts of things. That is largely where our strategic direction comes from. The Mayor has a policy called ‘Equal life chances for all.’ (…) There is a definition for equality given in the document. It is a little broader than accessibility, but it talks about: “An equal society which protects and promotes equal, real freedom and the opportunity to live in the way people value and would choose, so that everyone can flourish. An equal society recognises people’s different needs, situations and goals and removes the barriers that limit what people can do and be.” The work which I do relates to the more transport focussed aspects of that.” (appendix D p.244).

2.2 DISABILITY AWARENESS TRAINING FOR STAFF

All staff in London receive thorough disability awareness training which is regularly refreshed. Some training is given to BVG and S-Bahn staff in Berlin, but there are no clear details as to its extent or exact content and how often it's updated, if at all. Christine Albrecht at BVG and Bettina Jeschek at the Berlin S-Bahn would appear to have more of a distant, advisory role on the disability awareness training received by staff in their respective organisations, rather than the more proactive and interactive approach adopted in London.

CA: "We have academies where all our bus, tram and underground drivers are fully trained. This of course includes training to deal with disabled travellers. This has most relevance with respect to the bus drivers, as they have the most direct contact with the passengers and so have the most problems to deal with. Tram drivers and even less so underground drivers have relatively little contact with their passengers. One part of a bus driver's training includes firsthand experience of being in a wheelchair. He/she must then try and board the bus both propelling themselves and then being pushed by another person. This enables them to see things from the perspective of a wheelchair user. From this year there's also a so-called EU schooling, which has been introduced by the EU and this involves a similar training exercise, but this time as a blind person. The driver is blindfolded and then a bus draws up in front of them, but with the door not directly in front of them. Then they have to attempt to board the bus as a blind person would. They are then fully aware of the challenges blind people face in finding the door and safely boarding the bus." (appendix B p.229).

There is a strong element of direct input and involvement of disabled people in shaping the content and delivery of the training received by TfL staff, which seems to be in stark contrast to the methods in use in Berlin.

WT: “The ‘Equality Works’ service provider employs disabled people who represent the needs of those passengers with special needs. They also receive input and guidance on a strategic level from TfL’s own ‘Independent Disability Advisory Group’ (IDAG). This is a group of disabled people, who are paid for by TfL and who advise us on all aspects of our service, to make sure that we are complying with current legislation, regulations and best practice. (…) The elements concerned with disability and equality are however fully integrated in to all aspects of the training package. We think that the training we’ve got and the checking and control mechanisms we have in place are working effectively. Our current performance indicators suggest that they are, but I guess that there is always scope for improvement and we’re constantly monitoring the situation. We have tended to find though that this integrated approach to disability awareness training encourages our staff to think of all people as a holistic kind of concept. A lot of the training over the past two years has focussed on people with hidden disabilities such as learning difficulties, or those for whom English is not their mother tongue, as well as those who have obvious physical or sensory impairments.” (appendix D pp.245-246).

Christine Albrecht admitted that she would like to see all of BVG front line operational staff receive more disability awareness training. This aspiration would appear to be well founded after the poor attitude displayed by one of the BVG tram drivers witnessed firsthand during a trip together with wheelchair user

Corinna Lichtenberg (see chapter 1.5). CA: “I would increase the amount of disability awareness training received by our drivers and our other members of staff. I would also install two or more lifts at every underground station instead of just one, so that if one is out of service for whatever reason, the station is still fully accessible to everyone. In my experience I’ve found that the demands and wishes of our customers grow much faster than our ability to fulfil them all.” (appendix B p.235).

A further example of the need for greater staff awareness training in Berlin was illustrated succinctly by something I experienced firsthand when using the Berlin S-Bahn. All S-Bahn and U-Bahn trains have passenger-activated doors unlike in London, where at least on the Underground the driver opens all the doors at every station. Even with the new S Stock trains on the subsurface lines of LU, all the doors open after the train has arrived at the platform and remain so either for as long as station dwell time, or at a terminus such as Baker Street for at least sixty seconds before closing again.

On this occasion, an S-Bahn train arrived, but unfortunately no door opened in my near vicinity. I began to walk towards the nearest door which I’d heard open, whilst also feeling along the train to try and locate the button of a door closer to me. Once the allotted dwell time of around thirty seconds had elapsed however, the driver simply gave the usual warning to mind the doors, closed them and duly despatched his train with me still having physical body contact with the side of it.

As I am a well seasoned traveller, I quickly stepped back and wrote the whole thing off to experience. When the next train arrived, a door opened very near to me and so I was able to board without any further difficulty. Less confident travellers may have found the whole experience highly traumatic and may have been scared to venture out on their own again on public transport for a considerable time. Several other independent blind people who I chatted to over lunch during a visit to the Berlin Institute for the Blind in October 2010, all confirmed that they'd had similar experiences on the S-Bahn on more than one occasion.

Although it cannot be stated categorically that this type of event would never happen in London, it has certainly been my experience that whilst having physical contact with the body side of a carriage, the train will not just move off. Most drivers will reopen the doors and let you on; alternatively they will just remain stationary in the platform until you step back from the train before they depart. This behaviour can be most likely attributed to the far higher level of disability awareness training received by operational staff in London and to the fact that it is also refreshed on an annual basis.

2.3 COMMUNICATION AND SUMMONING ASSISTANCE

In Berlin there are communication points on every platform, where people can speak to someone at a help centre and request either journey information by pressing the blue button or the yellow button, which is at wheelchair height, or summon help in emergencies by pressing the red button. There are also emergency stop levers on each platform, but their exact location is not widely publicised for fear of them being misused primarily by younger people fooling around. This partly compensates for having a mainly open network with few station staff. CA: “During such training days as I’ve mentioned, we do discuss these things with our clients.” (appendix B p.230).

The precise location and correct use of this equipment was indeed discussed in detail and demonstrated at a mobility day, which I attended personally in October 2011. Everyone learnt how to obtain information or request non-emergency assistance from the communication points, as well as learning to use the emergency levers on the platforms in critical situations. There was also the opportunity to get down on to the trackbed itself and to explore the safety pits under the platforms. It was advised that if anyone were to fall on to the track by accident, then they should shout for help and crawl into the safety pit which runs the whole length of the platform and wait for assistance to arrive. After speaking to a handful of the participants on the day, they all agreed that it had been extremely useful and they would feel more secure using the U-Bahn system independently in the future.

There is also a personal one-to-one escort service coordinated by Verkehrsverbund Berlin-Brandenburg (VBB), which is funded currently by the Berlin S-Bahn compensation payments to the Senate and state of Berlin up until 2014. This free escort system provided by VBB began in Berlin in October 2008 and was subsequently expanded due to popular demand. Requests for assistance have to be booked a minimum of 24 hours in advance either by phone or online, giving precise details of the journey planned, as well as the exact nature of the disability of the person wishing to travel. This is so an appropriate route can be planned i.e. step free wherever possible if the client is in a wheelchair, and the correct number of escorts can be assigned to the job, i.e. 1 for most disabled people, but 2 whenever a wheelchair is involved.

The volunteers are of all ages and social backgrounds, and have either recently become unemployed or have been out of work for a longer period of time. There are no restrictions on who is eligible to use the scheme, other than they must have some form of disability. This appears to be an extremely useful service to help overcome any barriers to mobility encountered by both Berliners and visitors to the city, especially as the escort service covers both Schönefeld and Tegel airports and will also cover the new Berlin Brandenburg International (BBI) airport when it finally opens for business in October 2013. At its height, the scheme was staffed by 120 volunteers, but unfortunately this had to be reduced back down to the original number of 60 in 2011 due to funding constraints. The opening hours of the service were also reduced, so that it now only operates up until 19.00 Monday-Friday rather than 22.00 previously and the service at weekends has been stopped completely.

2.4 THE INVOLVEMENT AND INPUT OF DISABLED PASSENGERS IN THE DELIVERY OF THE NETWORK

In London, customer feedback and satisfaction are closely monitored by TfL through their customer service centre and website. Specific problems concerning certain members of society e.g. disabled people are then referred on to the appropriate department. Wayne Trevor also commented on the key role the TfL customer service centre plays in monitoring and recording both good practice and problem areas to be addressed in the future. WT: “If we start to see a rise in the number of complaints or even praise from a certain community group, then that suggests that something might be changing out on the network and there may be some issues which we need to address.” (appendix D p.246).

In Berlin, Christine Albrecht stated that the BVG customer service centre answers all calls which come in 24 hours a day, but relevant ones are then filtered through to her to deal with specifically. CA: “Sometimes matters are referred to me, if they concerned disabled passengers. I can’t personally be a contact for every disabled passenger in Berlin, as I’d never otherwise have the time to get anything else done here at BVG e.g. working on various projects or raising disability awareness within the organisation.” (appendix B p.234).

Angelika Simon talked about how easy it is for passengers, especially disabled ones, to get in touch with the S-Bahn to report incidents of lift breakdowns, anti-social behaviour or any other problems, and, where necessary, one of the mobile station and service teams can be quickly despatched to help deal with

such incidents promptly and efficiently. AS: “We have mobility posters on all our stations with a hotline phone number to ring, (…) Disabled customers can also ring this number, if for example they’ve arrived at a station, have discovered that the lift isn’t working and they require further assistance. Customers can also communicate with us via the information points on the platform as well, so there are at least two ways of easily getting in touch and alerting us quickly to a problem. This is also true if people notice anyone acting suspiciously i.e. groups of youths hanging around stations drinking or being abusive. A quick phone call to us can often prevent this type of situation escalating and has in the past almost certainly stopped episodes of vandalism before they’ve actually taken place.” (appendix C p.239).

Christine Albrecht also mentioned the working group for disabled people, which has representatives from all of the disabled associations, as well as many individuals with different physical and sensory impairments on the one hand, and on the other, representatives from all of the key transport providers and the Berlin Senate. The main focus of the group is to bring disabled passengers and transport operators together, to share experiences and develop strategies, and shape future transport planning and policies, in order to continue improving accessibility to public transport services within Berlin and surrounding areas.

2.5 INVESTMENT IN NETWORK ACCESSIBILITY

London has profited from major infrastructure investment schemes to enhance capacity further prior to the 2012 Olympic and Paralympic games.

WT: “At the moment there are 62 step free stations, following the opening of the final lift down to the Northern Line at Kings Cross St Pancras in October 2010 and the completion of Kingsbury and Southfields stations earlier on in the year. This number will increase to 65 by 2012. The three further stations are Green Park [completed in September 2011] (see TfL 2011B), Farringdon, which is being heavily worked on in relation to both the Thameslink 2000 and Crossrail schemes [due to reopen fully in autumn 2012] and Blackfriars, which has been completely rebuilt, along with the national rail station and is due to reopen at the end of 2011 [reopened in February 2012]. That then represents 24% of the network (see table 1.3), which will be step free by the time of the London Olympic and Paralympic games. (…) The next phase of improvements will come with the opening of Crossrail, which will give us new, step free stations at Whitechapel, Liverpool Street/Moorgate, Farringdon/Barbican, Tottenham Court Road, Bond Street and Paddington Hammersmith & City Line station platforms 15 and 16. Those 6 stations, together with Victoria, which is a separate project which has now finally been given the green light, then bring us up to 72 stations (27%) by around 2018.” (appendix D p.248).

When analysing the figures quoted by Wayne Trevor for step free stations on the London Underground and those published in TfL (2011A) for step free stations on the National Rail and London Overground networks, which currently total 31% of the network, it appears that the equivalent figures for the Berlin

networks are vastly superior (see table 1.3). It should be emphasised though that Berlin does not have deep level tube lines as in London and it also has a smaller network overall. These are both contributing factors to the Berlin figures for step free access, appearing substantially higher than those for London. The S-Bahn also has very few stations actually underground (only 6 on the Nord-Südbahn, but almost all the stations on the Ringbahn are above street level and therefore require lifts/escalators/stairs up to the platforms).

CA: “We want to make all our stations barrier free one day. It is a realistic target for us. We started twenty years ago and we plan to do about five stations per year and at present we’re managing to stick to this aim. (…) Barrier free access to the underground (U-Bahn) for us, would mean a lift or ramp, to and from the platform. It also involves the installation of the so-called ‘Blindenleitsystem’ (Blind guidance system) which are a series of raised grooves to clearly denote the platform edge and strips leading off this guide you to stairs or escalators exiting the platform. (…) As a rule each station firstly receives a basic level of accessibility, which includes the installation of the guidance system. This is something we can do ourselves without the need to obtain permission from other authorities. The installation of lifts takes a lot longer, as it can sometimes take years to gain the relevant planning consent.” (appendix B pp.232-233).

AS: “We want to give everyone the opportunity to travel on our network freely and safely. (…) Over the past three years, around €15.4 million has been invested in the installation and maintenance of lifts at our stations. (…) There are guidelines which stipulate the minimum size of lift we can install in a station, so that at least one wheelchair/buggy/pram will fit into it, but we try and aim to

install the largest lift possible in the space available to us. As each installation is virtually an individual one, we don't hold spare parts in stock for each of them. We do unfortunately have a major problem in Berlin with vandalism. In spite of our best efforts, when a lift is damaged during an attack, it can often take a while for us to order, obtain and fit the necessary spare parts. During this time when the lift is out of use, it has a major impact on the accessibility of the station, as it may well prevent certain regular customers who are reliant on the lift from using, what might well be their local station." (appendix C p.238).

Tactile platform markings have currently been installed at 140/168 (83%) of S-Bahn stations and 107/173 (62%) of U-Bahn stations in Berlin (see chapters 1.1 and 1.4). All London Underground stations are to be fitted with tactile strips by the end of 2013 (see TfL 2011B). Wayne Trevor went on to explain about some of the other equipment being installed at stations to enhance independent travel for disabled passengers.

WT: "Firstly, looking at the question of audible announcements on platforms, many stations now have the equipment for this already installed, but the signalling system which controls it has not yet been upgraded. This needs to happen in order for it to work correctly. (…) The tactile markings along the platform edges we recognised were so important than say general refurbishment works, that we're running a separate scheme for this. (…) We have a number of separate projects working to deliver this and we're trying to be very cost effective in the way we do that work. We're very aware that such a system only works effectively when it's a complete system and so there's no point in only doing half a platform at a time and then having a long delay before

the other half gets done. (…) These programmes also include fitting all stations with the tactile markings at the top and bottom of flights of stairs and making improvements to the colour contrast of handrails on staircases."
(appendix D pp.248-249).

It appears that one difference between the S-Bahn, BVG and TfL is that the S-Bahn do not own their own stations and simply lease them from DB Station and Service. As a result, they always need to gain appropriate permission from the DB subsidiary, in order for them to carry out the desired improvements. This situation is paralleled in London, where the Train Operating Companies, e.g. Southeastern, Southern, South West Trains (SWT) and First Capital Connect (FCC) lease the stations they serve from Network Rail. The only exceptions to this are those stations which have been transferred from Network Rail to London Overground, which is operated by TfL.

BJ: "BVG, as you may know, owns all its own trains and stations. The S-Bahn Berlin GMBH (limited company) is an independent run subsidiary of Deutsche Bahn (DB) and all the rolling stock is owned by them. The stations are owned and looked after by another subsidiary of DB namely DB Station and Service. Our current network totals 166 stations [will be 168 from October 2013], of which 29 have level access or ramps, which are suitable for wheelchairs and 110 have lifts installed [currently 118 stations have lifts installed making a total of 147 out of 166 step free stations, which will be 149 out of 168 by October 2013]. At present 95 of these have also got the tactile blind guidance system [now 140 as of September 2012]. Work is planned at 40 more stations over the next few years and we hope of course eventually to have completed the

installation of such systems at 100% of stations. This aspiration though is still some way off. (…) There are also certain features at larger stations like Hauptbahnhof; for example Braille notices at the top and bottom of stair handrails, which tell you what platforms you're climbing up to or down from and where the nearest exit is (see chapter 1.1). As the architect at the Berlin Blind Institute Herr Peter Woltersdorf doubtless explained to you, there is only a certain amount of information which can be sensibly put on such signs, but for those that read Braille, they certainly find it a great help to be able to get some useful information when arriving on or exiting a platform."
(appendix C pp.237-238).

Bettina Jeschek's comments here support Wayne Trevor's assessment that tactile markings at the top and bottom of flights of stairs and along platform edges are a great help to the visually impaired and most likely to other groups of individuals as well. Wayne Trevor also made the valid point that the fitting of tactile strips on a platform has to be done along its entire length in one go, to be of most use. This means that the platform has to be taken out of use completely whilst the work takes place, which can usually be done either overnight during non-traffic hours or during weekend line closures for planned maintenance. The tactile strips are exceptionally useful and safety critical, not just for visually impaired passengers, but also for those who may be preoccupied with a smart phone or other portable electronic device. They may not be paying great attention to where they are going whilst walking along the platform, but will be reminded when they feel the blistered tiles that they are very close to the edge of the platform and should step back behind the yellow line.

The blind guidance system in use in Berlin was developed in Germany and aims to increase the independence of blind people further by giving them a fixed route to follow along the platforms. With the latest version of the system, the standard delineating tactile strip has patches of different markings built into it at various points along its length, i.e. square patches of bumps, which designate the route towards the stairs, or horizontal strips of blistered tiles which will guide you over to the lift or escalator. Whilst the thinking behind these additional tactile indicators seems to be very sound, it could be argued that their universal applicability remains questionable.

Bettina Jeschek discussed the problem of different stations having different variants of the blind guidance system (see Appendix C). These inconsistencies, in my view, seriously detract from the overall effectiveness of the system. There would appear to be a strong need for a European or possibly worldwide system of tactile markings, whose meaning is clearly documented and recognised. Foreign visitors to Berlin would then be more familiar with the various different tactile patterns on the platform and would be able to interpret the information conveyed by them much more easily.

A useful progression and refinement in my view would be to have a pattern of markings to designate the communication points on the platform, from which people can obtain information or call for help. It could be strongly argued though that the primary and universal function of such tactile systems anywhere remains as a clear delineator of the platform edge. In London, this seems to be the extent of TfL’s current thinking, whereas in Berlin, further improvements to

the blind guidance system, including a proposed tactile strip leading you to the platform help points, are all being given due consideration.

2.6 PROVIDING ACCESSIBLE INFORMATION

The usefulness of audible announcements on platforms giving details of the train just arriving is virtually unquestionable. In Berlin this is currently only in operation at most stations on the Ringbahn line of the S-Bahn, but a future role out of the scheme is planned for the rest of the S-Bahn network. It is particularly useful as the core sections of all three lines (Nord-Südbahn, Ringbahn and Stadtbahn) typically have an island platform, with trains on many lines sharing one platform in each direction. If you are boarding a train at the last common station before routes diverge, it is vital to know the precise destination of the train before boarding, to avoid having to double back on yourself if you're on the wrong train. It is also particularly useful, as dwell times, especially on the core sections of the network served by many routes, are kept to a minimum as far as possible, so boarding and alighting needs to be swift, in order not to have a negative impact on overall line capacity. BJ: "We also want to roll out the audible announcements on the platforms, which give details of the train just arriving. We already have most of the stations on the Ringbahn so equipped and we aim to continue rolling out this technology on a gradual basis. These improvements are also combined with new LCD displays on the platform, which are much easier for people to read and give details of the next three trains due at that platform and when they are scheduled to arrive." (appendix C p.241).

The Berlin U-Bahn and deep tube lines on the Underground typically have a simpler service pattern, with trains running from end to end having separate, designated platforms for each direction along the route. Many of the London Underground stations already have these announcements activated on the deep level tube lines. The subsurface lines are due to follow on during the current ongoing upgrade programme running until 2017. Such on platform announcements are as yet totally lacking from the Berlin network. This is not usually a problem, as only trains from a particular line use their respective platforms for a given direction. There are however a few occasions e.g. at Wittenberg Platz, where trains from both U1 and U3 use the same platform in either direction.

It could be argued that a useful addition for both BVG and the Berlin S-Bahn would be the adoption of a similar system to the TfL live departure boards. These are easily accessible via their website and allow you to firstly select a line and then a particular station, from where you are able to view the next three services to call there in each direction. This information is available both at home and on the move, using a modern mobile phone and proves to be extremely useful when either planning a journey or simply obtaining a live service update before heading off to the station. The Berlin S-Bahn are about to begin trials of such a realtime system, but it is still very much in its infancy at the present time.

2.7 POSSIBLE FUTURE IMPROVEMENTS IN ACCESSIBILITY

Staffing levels on the Underground are, according to Wayne Trevor, due to remain stable in light of the current economic climate and proposed ticket office closures. He feels that there will come a time in the future when a situation may exist on the London Underground, when people may well have portable way finding devices from where they can request assistance and be guided verbally, or, if necessary, physically to their desired destination.

WT: “The Mayor as I understand it, has also made a mayoral commitment to continue to staff stations and that’s a promise that the Underground are still honouring, i.e. while stations are open, those which are currently staffed will continue to be so and that happens to be the majority of stations on the network. Customers from all walks of life tell us that a staff presence at stations is a really good thing, from the safety and security perspective, as well as from the help and assistance perspective.” (appendix D p.249).

Bus offers a more accessible, but typically slower alternative mode to the underground or commuter rail in both Berlin and London. WT: “One of the plans constantly to improve the accessibility of the Underground is about providing an equitable service. For example, if you’re travelling from Kings Cross to Brixton, you can either make that journey via two accessible buses, or of course by the Victoria Line of the Underground. Even if the first bus is waiting when you arrive at the stop in Kings Cross, that journey will probably take around an hour or so, and if it’s at peak times, it’s likely to be more than that. The same journey on the Victoria Line should take twenty-twenty five minutes, provided of course that

there's no unforeseen service disruption at the time you're travelling. So, clearly it's fine for TfL to say that there's an accessible bus service, but it's not the same level of service which is offered by the Underground. One of the comparisons we've made in upgrading the Victoria Line with the new trains and accessibility features at the stations, is that it represents the quickest way between these two points for a wheelchair user, visually impaired traveller and everyone else for that matter. Even if you drove or got a taxi, it'd still be quicker by tube." (appendix D pp.250-251).

Journey planners on transport providers' websites are making things easier for disabled people, to tailor an individual journey to their own needs. After the trip together with wheelchair user Corinna Lichtenberg across Berlin, she confirmed that such journey planning tools are essential for her to maintain her independence. She can plan her route before leaving home and can check and replan if necessary via her mobile phone whilst on the move, in times of service disruption or lift failure. Some re-routing on the move became necessary during our trip together, due to a broken down lift at one of the U-Bahn stations she had planned to use. One drawback is that realtime information needs to be provided about such breakdowns, to alert people to this so that they can find alternative step free routes before commencing their journey.

This was something acknowledged by everyone interviewed, and is an issue which is being addressed by all of the respective transport operators in both Berlin and London. It is interesting to note that different types of realtime information are of greatest benefit to different sorts of disabled customers, e.g. visually impaired people most need to know the direction and destination of the

next service, but are not usually directly affected by lift breakdowns or routes which are not entirely operated by low floor vehicles. The exact opposite applies to most wheelchair users, who are wholly dependent on lifts being in working order or a low floor vehicle operating the service, to facilitate them boarding and alighting from it safely and independently, but who are usually able to read information screens at the stop or platform concerning the next arrivals and departures from there.

CA: “We have extra leaflets with our map printed in them and the stations with lifts and/or ramps are clearly marked on the maps, as they are on those displayed in the trains themselves. (…) We have a journey planner service on our website, which also contains full information about accessible stations. In the past few months we’ve further improved the journey planner, so that customers can now specify the degree to which they are dependent upon stations being fully accessible, e.g. a totally barrier free route for a mobility impaired person, in which only journeys will be displayed that are wholly barrier free for wheelchair users i.e. with lifts and without stairs or escalators. Alternatively, you could have a partially barrier free route if you have a child’s buggy/heavy suitcase with you, then you might be shown a route still with no stairs, but this time with escalators included.” (appendix B p.233).

BJ: “We also want to improve things like realtime information etc. so that people can register on our website and be kept up-to-date with delays or lift breakdowns etc. by email or text message. That way we can get the very latest information out to people as soon as it happens and they can plan an alternative route if necessary. This will be especially useful for disabled

customers reliant on lifts, as we'll be able to notify them immediately when a lift for whatever reason goes out of order, so that they can avoid this particular station and hopefully have a smoother, less disrupted journey. Our staff will always be on hand though to help and this won't change." (appendix C p.241).

WT: "We're also designing a number of improvements into the journey planner on the TfL website, which will allow people to be able to select, for example, a step free journey from A to B. We're hoping that the improved planning tool will go live sometime in mid 2011." (appendix D p.251).

One major journey planning tool which requires much greater standardisation and ease of use in both Berlin and London is the provision of accessible network maps. Much emphasis is placed on highly graphical interactive maps, which are totally unusable by visually impaired travellers, who require a description of the network in plain text. BVG and the Berlin S-Bahn do have text descriptions of each line on their websites, but these are not immediately obvious from the home page and they also lack links to other transport modes.

This means that when reviewing the list of stations on a particular line, although reference is made to other lines at interchange stations, you are unable to change lines virtually as it were and view the list of stations on the line you want to change on to, without returning to the main index page and selecting that line. BVG also has no descriptions of the S-Bahn lines, even though reference is made to them at interchange stations, and exactly the same is true for U-Bahn and Tram services on the S-Bahn website.

There is a complete lack of details of individual bus routes which serve specific S-Bahn and U-Bahn stations on either website, although the general term bus is used to indicate wherever interchange is possible. Text descriptions of some of the key bus routes are however available from the BVG website, but again are not easy to find and remain in isolation, unconnected to the information about the other modes.

The TfL website has a number of different resources available from its accessibility link, including guides to step free stations or stations with accessible toilets etc., but surprisingly they also do not have a fully accessible, integrated network map.

TfL (2011B) contains details of a new map recently launched, which provides far more explicit information about the levels of step free access at Underground stations. “Previously, stations which are step free between the street and the platform were indicated with a blue wheelchair symbol. No information was provided about the step and gap between the platform and the train. The new version of the map will use two different symbols. Stations which are step free between the street and the platform will be shown by a blue wheelchair on a white background. Stations which are step free between the street and the train will be shown by a white wheelchair on a blue background. This will allow customers to identify at a glance whether a station, or particular line at a station, is accessible for them.” (TfL 2011B pp.1-2).

For the past four years, I have personally been heavily involved in a project to devise fully accessible text maps of the London Underground, London

Overground, Docklands Light Railway and London Tramlink networks, as well as similar resources for the rest of the national rail network and all other light rail and metro networks in Great Britain outside the greater London area. The maps are fully integrated and cross-linked with one another, so that other lines passing through an interchange station can be accessed straightaway. This massive project was completed in June 2011 and it is hoped to promote this unique resource in the coming months and encourage TfL and the other TOCs to link to these maps from their own websites in the future. All of the maps can be found at http://www.describe-online.com.

Wayne Trevor and Christine Albrecht are very optimistic about future technological advances, which should help make travelling easier for disabled people and increase their independence still further.

WT: “It clearly won’t work for everyone and we won’t stop making physical improvements to our network wherever possible, but I think when we get some further refinements to the mass consumer technology which is already out there, it will be a useful mobility aid which will boost people’s confidence at the same time. Even if the technology isn’t able to guide you through a station that you are unfamiliar with, it could give you an immediate link with somebody who could guide you through the station, either over the phone or personally once they’d come over to you. I think such technology will also start filling in the gaps in providing information.” (appendix D p.252).

CA: “Eventually most visually impaired people will have a mobile phone, which will have the facility on it to be able to tell and speak out which

bus/tram/underground train is coming next and in which direction. That way they get the information they require, but everybody waiting doesn't have to hear the announcement." (appendix B p.235).

2.8 CONCLUSION

One interesting underlying question as a conclusion to this chapter is why in general, TfL in London seems to have a more proactive approach to accessibility and whether it is some broader cultural difference in terms of the emphasis on the needs of disabled people, compared with BVG and the S-Bahn in Berlin. Whilst one can only really speculate on the reasons behind this, it could be suggested that TfL is now trying to make up for substantial under-investment during the past years and decades and they now wish to pursue their aim of making their public transport networks as accessible as possible to all passengers, regardless of their impairments.

The Disability Discrimination Act (DDA) 1995 and its successor the Equality Act 2010, as well as the awarding of the 2012 Olympic Games to London in July 2005 have all acted as catalysts to further this aim, although the relative levels of improvements and rates of overall change have often been somewhat slow. Berlin is still investing heavily in its public transport networks following years of neglect during the division of the city. The many high floor Tatra trams built in the Czech Republic and still in daily service on the network are a reminder of a bygone age, which is yet to be consigned to history.

One of the most difficult challenges facing both TfL and BVG/Berlin S-Bahn is the fact that no one accessibility improvement measure suits everyone. As has been demonstrated during this chapter, there is always a need for a package of flexible measures, in order to benefit customers who have a diverse range of physical and sensory impairments. One size certainly does not fit all as far as accessibility improvements to the network are concerned. Advances in mobile phones and other portable navigation devices have already made big inroads into giving disabled people independence and future technological advances will doubtless continue to further this aim. As Wayne Trevor rightly pointed out however, technological solutions do not suit everyone and there is still a need for transport operators to continue to develop and adapt their networks to cater for the diverse needs of a wide range of people. It is in my view virtually impossible for a public transport network to become totally accessible to everyone, due primarily to funding and time constraints, but also to the vast range of differing passenger needs. The transport operators in Berlin and London should not stop striving to achieve this aim though, but it is perhaps more of a utopian dream than an achievable reality.

CHAPTER 3

THEMATIC COMPARISONS

INTRODUCTION

This chapter aims to highlight and explore some of the key broader issues surrounding the main theme of accessibility. It begins by discussing some comparative trends in Berlin and London concerning levels of car ownership and public transport use. These help to explain the different levels of access, which people have to a car and to their nearest public transport stop or station (see table 3.1 below).

Network structure i.e. hub and spoke or orbital and tangential patterns of public transport services can be adapted to support and suit more diverse travel behaviour, which have resulted from the dispersal of activities and the more widespread use of the car. Good access to the public transport network, as well as ease of use e.g. good physical interchange between public transport modes and transferrable ticketing between them all contribute to making it a viable alternative to the private car.

Whilst cycling certainly cannot be considered to be an accessible mode for most disabled people, it does account for an increasing share of feeder and distributor trips to and from public transport. This is particularly pronounced in Berlin, where levels of cycling are up to four times higher than in London.

Investment in infrastructure and rolling stock, together with bus and light rail investment both help to explain the differing levels of physical access on and off the vehicles themselves. Whilst Berlin and London enjoy fully low floor bus fleets, the number of low floor trams in Berlin only represents around 40% of the fleet, which is substantially less than in London, where the whole London Tramlink fleet is low floor. This situation is set to improve gradually over the next few years until the withdrawal of the last Tatra vehicles in 2017 (see chapter 1.1 and appendix B).

Operational structures examines how the respective Berlin and London networks function as a whole and highlights the key differences between the competitive tendering system employed by TfL in London, as opposed to the direct control and major monopoly enjoyed by BVG on Berlin's bus services.

The final theme of labour productivity and efficiency continues on from the previous strand and illustrates the differing ways in which both BVG and TfL have succeeded in increasing staff output, whilst being forced to implement considerable reductions to their workforce. Both operators have needed to streamline their operations, whilst continuing to encourage and subsequently increase their ridership.

As a useful starting point a table has been compiled, highlighting some of the main similarities and differences in population and public transport usage in Berlin and London, using primary indicators drawn from a variety of sources.

TABLE 3.1 KEY INDICATORS FOR BERLIN AND LONDON

CITY	BERLIN	LONDON
POPULATION (MILLION)	3.44	7.75
AVERAGE HOUSEHOLD SIZE	1.7	2.1
CAR OWNERSHIP (cars per 1,000 population)	317	342
DAILY TRIP RATE BY ALL MODES	2.93	3.11
PUBLIC TRANSPORT MARKET SHARE (%)	28	37
P.T. TRIPS PER HEAD OF POPULATION PER ANNUM (approx)	300	367
URBAN POPULATION DENSITY (PERSONS/HA)	54.7	47.6
URBAN POPULATION +JOB DENSITY (PERSONS/HA)	79.9	89.6
AVERAGE PUBLIC TRANSPORT PLACE OCCUPANCY RATE (PAX KM/PLACE KM)	0.141	0.166
RECOVERY RATE OF PUBLIC TRANSPORT OPERATING EXPENDITURE BY FAREBOX REVENUE (%)	42.6	81.2
AVERAGE OPERATING COST OF 1 PUBLIC TRANSPORT VEHICLE KM (EURO CENTS)	375	421
AVERAGE OPERATING COST OF 1 PUBLIC TRANSPORT PLACE KM (EURO CENTS)	3.66	4.37
AVERAGE OPERATING COST OF 1 PUBLIC TRANSPORT JOURNEY (EURO CENTS)	130	170

SOURCES:

N.B. Please note the dates applicable to each item of data.

Population and average household size

Berlin: Amt für Statistik Berlin Brandenburg (2011), Mikrozensus 2009, http://www.statistik-berlin-brandenburg.de/BasisZeitreiheGrafik/Bas-Mikrozensus.asp?Ptyp=300&Sageb=12002&creg=BBB&anzwer=2 last accessed Friday 22/04/2011.

London: TfL (2011A), section 5.2, p.125 and Census 2001 http://www.statistics.gov.uk/census2001/profiles/commentaries/housing.asp Last accessed Sunday 24/04/2011.

Car Ownership

Berlin: BVG (2007), Zahlenspiegel, table 2.4.

London: TfL (2008), table 4.4.1, quoted value of 330. Indicator was then checked with Office for National Statistics (ONS) by phone and updated figure of 342 inserted.

Daily trip rate by all modes

Berlin derived from MiD2002 report on key findings (Ergebnisbericht).

London: Derived from TfL (2011) table 2.1.

Public Transport Market Share

Berlin: Figure provided by Ralf Resch of BVG and also checked with Helga Jahn at Berlin Statistics office.

London: TfL (2008) table 1.1.1.

P.T. TRIPS PER HEAD OF POPULATION PER ANNUM (approx)

Berlin: BVG (2007) Zahlenspiegel and Berlin S-Bahn website: http://www.s-bahn-berlin.de.

London: TfL (2011) table 2.1.

URBAN POPULATION DENSITY (PERSONS/HA)

Berlin: Indicator taken directly from UITP (2007).

London: Originally taken from UITP (2007), but figure deemed to be wrong and was duly recalculated using TfL (2008) table 7.1.1.

All other indicators in the table were taken or derived from UITP (2007).

3.1 Comparative Trends

Although London's overall population and total urban area are both roughly double those of Berlin, many similarities exist between the two cities as shown by these primary indicators. The car ownership per 1000 inhabitants is remarkably similar and the overall public transport trip rates are also comparable, in spite of London's considerable difference in size. An element of double counting exists in both cities however; in London this affects the bus network, where every bus boarding is registered, even though it may only be forming part of a bus stage of one linked trip. In Berlin double counting exists when interchanging between the S-Bahn and U-Bahn network, but not between the U-Bahn, Straßenbahn (tram) and buses of BVG.

The table shows that London covers a much higher proportion of its operating costs from revenue (81.2%), as opposed to (42.6%) in Berlin, but has a higher unit cost per journey (170 compared with 130 Euro cents). A clear implication which can be derived from these figures is that fare levels in London will be much higher than equivalent ones in Berlin. This is confirmed when comparing the prices for single tickets, weekly and monthly travelcards in both cities. The following table shows some typical prices, which are correct as of August 2012.

TABLE 3.2 COMPARATIVE FARE LEVELS IN BERLIN AND LONDON

CITY	TYPE OF TICKET	PRICE IN POUNDS STERLING
BERLIN	SINGLE JOURNEY ZONES A AND B	1.90
BERLIN	WEEKLY VBB ENVIRONMENT CARD ZONES A AND B	22.10
BERLIN	MONTHLY OFFPEAK VBB ENVIRONMENT CARD ZONES A AND B	43.80
BERLIN	MONTHLY ANY TIME VBB ENVIRONMENT CARD ZONES A AND B	60.75
LONDON	SINGLE ZONES 1-6 CASH	5.30
LONDON	SINGLE ZONES 1-6 OYSTERCARD (PEAK)	4.80
LONDON	SINGLE ZONES 1-6 OYSTERCARD (OFFPEAK)	2.90
LONDON	WEEKLY TRAVELCARD ZONES 1-6	53.40
LONDON	MONTHLY TRAVELCARD ZONES 1-6	205.10

The exchange rate used for the Berlin fares was €1 = £0.79, as listed on (http://uk.reuters.com/business/currencies (last accessed at 13.00 on Friday 03/08/12). All prices when converted from Euros were rounded up to the nearest 5 pence. Off-peak monthly VBB Environment Cards (Umweltkarten) are valid for travel after 10.00 on weekdays and any time at weekends or other public holidays. In London such travelcards are usually valid after 09.00 for the rest of that day.

Another notable difference between the two cities is the high level of employment in central London, which produces substantial levels of commuting from the outer suburbs and beyond into the central area. This in turn raises the public transport trip rate figures per head of London population, especially concerning journeys on the Underground made with in zone 1, as people travel

from one of the Overground main line termini to their place of work. This influx of commuters may also be increasing the overall share of trips made by public transport, as they arrive and depart primarily by rail and don't have a car available to them. They are therefore increasing the share of all trips made by public transport averaged out over the whole of the working day.

Although there are commuter flows in and around Berlin, there is not the same substantial influx of commuters into the central area on a weekday morning and a similar outflow of traffic again in the evening. This is partly due to the difference in urban form and structure of Berlin and its public transport networks and the fact that employment in Berlin is not concentrated so heavily in the city centre.

The additional London commuter trips, mostly made by Underground within the central area (zone 1) by people from outside Greater London may well lead to a degree of overstatement of the actual public transport trip rates, when the total number of trips is divided by the resident population (see Martin 2008). As a result of this, the figure for trips per head of population in London has been recalculated below, to obtain a more realistic value, by deducting the number of commuting trips into the central area from the total number of trips recorded and then dividing this figure into the total population.

Taking the population figure for London of 7.75 million and the annual figure for trips per head of population of 367, this gives a total number of trips per annum of 2844,250,000.

Using Table 2.10 from TfL (2011A) the figure quoted for people entering central London and transferring to the Underground/DLR on a weekday morning in 2009 is 225,000, which should be doubled to 450,000 to allow for return trips in the evening.

Taking a typical working year of 225 days, this gives a figure of 225000 x 2 x 225 = 101,250,000 trips per annum.

The annual total of journeys, excluding those made by people entering London and transferring to either the Underground or DLR therefore = 2844,250,000 - 101,250,000 = 2743,000,000.

The estimated annual trip rate per head of London population therefore = 2743,000,000 / 7750,000 = 354.

This means that the trips made by people commuting into central London and then travelling on to work via the Underground/DLR in zone 1 represent around 13 trips per year per head of London population.

Detailed discussion and statistical analysis of crosstabulations using data from the Mobilität in Deutschland (MiD 2002) and the National Travel Survey (NTS 2002-2008) household surveys can be found in chapter 4 of this work and the crosstabulations are contained in Appendix A.

3.2 NETWORK STRUCTURE

Pharoah and Apel (1995) comment on the importance of the need for hub and spoke patterns of public transport services, which can be adapted “to support and suit the more diverse patterns of travel, which have resulted from the dispersal of activities and the more widespread use of the car.” (Pharoah and Apel p.16). They continue by describing two possible forms of adaptations which may result. The first is the creation of orbital/tangential routes i.e. the Ringbahn in Berlin and the Circle Line on the London Underground, as well as the orbital route which will be formed by three different lines of the London Overground network once the missing link from Surrey Quays to Clapham Junction is completed at the end of 2012 (see chapters 1.2 and 3.4 below).

The bus network in London currently fulfils the vital role of linking together the many outer suburbs and in so doing illustrates London’s polycentric structure. Although the greatest concentration of employment is situated in central London, the city is surrounded by several urban business and population centres e.g. Croydon, Ealing, Ilford and Kingston, and about 75% of the bus journeys in London occur outside the central area in zones 2-6.

The second adaptation is providing intermodal/multimodal travel opportunities, which may include such things as park and ride, bike and ride or the ability to take your bike with you on trains (see chapter 3.3 below).

Pharoah and Apel concur with Garbutt (1997) by stressing the importance of good interchange facilities at several points on the network regardless of its

overall structure. They expand upon this main aim of a public transport network by stating “It’s necessary not only to provide physical interchange between services, but also to make that interchange simple by minimising waiting times and providing simple tariff systems, that involve no financial penalty or inconvenience for people whose journeys involve using more than one service.” (Pharoah and Apel p.16).

These are all key issues in the smooth daily operation of public transport in Berlin and London. Both cities offer various types of travelcards and smartcard ticketing; the latter being best typified by the Oystercard in London. A new nationwide electronic ticketing scheme using smart mobile phones called Touch&Travel has recently been launched in Germany, which also includes all VBB services in Berlin and Brandenburg (see Radermacher and Fischer 2008). These ticketing systems allow passengers to interchange between modes seamlessly and without the need to purchase additional tickets. An easy transition between modes is vital if public transport is to encourage off peak travellers onto the network, who only opt to use it, if it really represents an attractive alternative to the car.

The provision of simple ticketing for rush hour commuters is highly beneficial. Their choice of modes is rather more limited, due mainly to their perceived value of time, which is significantly higher than that of offpeak travellers. Travelcards tend to generate additional evening and weekend journeys, as the overall cost of making these trips is perceived by the user as being marginal. This is because the cost has already been absorbed in to the initial outlay for the travelcard (see table 3.2 above).

Pharoah and Apel stress the fundamental importance that rail based modes have to play in integrated urban public transport systems. They remark that “Rail can play a greater role where concentrations of activity occur at important nodes on the network. Where activities are located at a number of central nodes (polycentric urban region), rail may play a smaller role […].” (Pharoah and Apel p.17).

London adheres to their description, as the main passenger activity is concentrated on the various termini surrounding central London. Berlin however does not appear to conform to their views, as rail (with respect to the S-Bahn, U-Bahn and regional rail networks) plays a key role in the Berlin public transport network, even though the city has a polycentric urban structure (see chapters 1.1 and 4.35), which highlight the vital function which rail plays in central Berlin.

3.3 THE ROLE OF CYCLING

The modal share of cycling in Berlin is much greater than in London, with approximately 8% of all journeys being made by bike, as opposed to only around 2% in London (see Pucher and Buehler 2008). This may well be due to the far better provisions made for bicycles in Berlin, which include safe storage facilities at many S-Bahn stations, together with specially designated areas on S-Bahn and regional rail services. Bikes are also permitted on the U-Bahn network at any time, provided that other passengers are not unduly inconvenienced.

The far higher use of the bicycle in Berlin may also account for a lower trip rate per head of population. It is not only a potential feeder mode into the other public transport networks, but it becomes a viable alternative for a shorter distance journey, which would otherwise be made by public transport. Heins and Wazlak (2010) suggested the view that Berlin has now become too bicycle friendly from the point of view of the operators and some public transport users and they cited some examples where cycling and public transport clash rather than complement one another. “Competition from cycling is now a permanent feature on feeder bus routes as passengers switch to pedal power. (…) Wide omnibuses are impeded by cyclists, have to crawl along behind the often much slower bikes, or are forced to pull out into the car traffic. As a result, the speed-up effect of the bus lane is counteracted and it becomes difficult to run services to timetable. […] For the operator, the carriage of bicycles on board BVG vehicles (metro, tramway, bus) is the most problematical possible combination. As well as the space which has to be made available for a bicycle (roughly 1.90 sq m, or four standing spaces), there is also a very real possibility of clashes with ordinary passengers (blocked gangways, dirtying of clothes), to the point where the latter may be deterred from travelling on public transport. Capacity bottlenecks (e.g. sudden deterioration in weather) as well as conflicts over space with wheelchair users and prams also arise [see chapter 4.65].” (Heins and Wazlak pp.2-3).

It should be pointed out that some of the difficulties outlined above by Heins and Wazlak could be alleviated by further improved, segregated cycling infrastructure. There is also a trade off in modal choice which means that if you

convert cyclists from using their cars, then they are more likely to use public transport as a result.

Givoni and Rietveld (2008) analysed cycling as an access/egress mode in the Netherlands, and wherever possible made comparisons between Dutch trends and those in both Germany and the UK. They concluded that the shift of short journeys from private car or public transport onto the non-motorised modes of walking and cycling brings with it significant environmental benefits. “(…) increasing the share of non-motorized modes in journeys to the station can have environmental benefits, since these journeys, although relatively short, take place in areas vulnerable to noise and air pollution.” (Givoni and Rietveld p.358).

These levels of substitution display interesting variations in time and are heavily influenced by such factors as fare changes and most recently the crisis with the Berlin S-Bahn network (see chapter 1.1).

Berlin and London both have very popular bike hiring schemes, which particularly suit commuters. In Berlin this is known as “Call A Bike” and in London is the Barclays Cycle Scheme.

In London it would be virtually impossible to permit the carriage of bicycles on underground trains especially during peak times, as the sheer volume of people travelling would make it difficult to find a safe space to store the bike whilst on the train and it would reduce much needed capacity on the trains themselves. It should also be pointed out that carrying bikes on the Berlin U-Bahn is permitted,

although it is strongly discouraged at peak times, whereas on the London Underground it is strictly prohibited at all times due to various safety issues and capacity constraints. This is primarily concerned with the safe carriage of the bikes on escalators to and from the deep level tube lines. Chapters 4.61-4.65 includes further commentary and statistical analysis on cycling in Berlin and London and the associated crosstabulations can be found in appendix A).

3.4 INVESTMENT IN INFRASTRUCTURE AND ROLLING STOCK

Since the early 1990's there has been a considerable amount of investment in replacing rolling stock and upgrading the infrastructure on many lines of the London Underground. The Jubilee line was extended from Green Park to Stratford in late 1999 and the remaining short stub to the former terminus at Charing Cross was taken out of use at the same time. The Jubilee Line now serves areas of London's Docklands, hitherto poorly served by public transport and eases capacity constraints on the Docklands Light Railway (DLR). This was the first major extension of the Underground network since the opening of the original line 20 years beforehand.

Eyers, Jones et al. (2004) examined the various benefits that the Jubilee Line extension (JLE) brought to some very deprived areas of East and Southeast London, which hitherto had poor access to vital public transport links. They concluded that for the most part JLE achieved the key aims set down by London Underground which were: "The provision of a direct link between Docklands and the commuter terminals of Waterloo and London Bridge; greatly increasing the transport capacity into the Isle of Dogs; providing

a direct link between Docklands and the West End; Strengthening public transport links between Stratford with its commuter services and Docklands; opening up the North Greenwich Peninsula; relieving congestion on existing lines and at existing stations; improving access by the Underground to Southwark and Bermondsey; improving access between the West End and Waterloo and London Bridge; relieving road congestion in a number of busy corridors." (Eyers, Jones et al. p.18).

Eyers and Jones admitted however that they were not able to assess fully all of these perceived benefits, i.e. relief of road congestion. It was also not always possible to attribute causation accurately to these benefits. The expansion of the Canary Wharf development was one of the key reasons for the JLE scheme going ahead in the first place. It acted as a crucial catalyst to accelerate investment and expansion in this area of London. JLE had to demonstrate the potential to cater for the future transport needs of Canary Wharf, which included several thousand new jobs, mainly in the financial sector. This in turn helped to sustain London's 'predominant financial position in Europe in the face of competition from other European capital cities.

In January 2006 the Jubilee Line trains were also lengthened from six to seven cars, together with the addition of four brand new 7-car trains. This increased capacity from 354 cars (59 x 6-car trains) to 441 cars (63 x 7 car trains). A further capacity increase has just been achieved following the completion of the major Seltrac resignalling scheme in July 2011. Automatic Train Operation (ATO) is now in use on the whole line and the moving block

signalling permits far shorter headways between trains, which in turn maximises line capacity. This was particularly important during the mass influx of visitors to London during the Olympic Games of 2012, especially as the line serves Stratford station, located near to the main Olympic stadium.

Crossrail has finally been given the green light by the government and is due to be operational in stages from summer 2017 onwards, with the central London section due to open at the end of 2018. It will have a vital role in providing additional capacity to enable Canary Wharf to continue expanding, as current capacity on both the JLE and DLR will have been reached by this time. A major programme of bridge strengthening and platform lengthening work was completed on the DLR at the end of 2010, and the new branch to Stratford International finally opened on 31. August 2011, exactly 24 years after the original DLR system was inaugurated (see chapter 3.5 below). 3-car trains are now permitted to run on the entire network and a fleet of new rolling stock has also been introduced into service. A special timetable was in operation during the Olympics and subsequent Paralympics in summer 2012, to maximize capacity and to cater for the increased demand for transport to and from the main Olympic stadium at Stratford.

Since the London Overground franchise was awarded by the DfT in late 2007, TfL began running certain services on the national rail network within Greater London. These also include the former East London Line of London Underground, which closed on 22. December 2007 and reopened on 28.

February 2010 having been converted for national rail operation and extended to Dalston Junction. Exactly one year later, the northern extension to Highbury & Islington opened for traffic and at the same time, trains began running beyond New Cross Gate to Crystal Palace and West Croydon in South London, whilst services on the branch to New Cross have remained relatively unchanged. A further extension to Clapham Junction is due to open in December 2012 (see chapter 1.1). A brand new fleet of air conditioned class 378 Capitalstar EMUs built by Bombardier were introduced to all electrified lines on the London Overground Network from 2010 onwards and a new purpose built depot for the 378s was constructed at New Cross Gate. A small fleet of new class 172 Turbostar DMUs also built by Bombardier were introduced around the same time to the Gospel Oak-Barking Line, which currently remains unelectrified for passenger trains.

The Underground is currently in the midst of a major programme of rolling stock replacement. A fleet of 47 2009 stock trains built by Bombardier has just been introduced on the Victoria Line. Their wider profile makes use of the generous tunnel clearances on the whole line, which was only constructed during the 1960s. The rapid acceleration and regenerative braking capabilities of the new trains, together with the use of the Distance To Go Radio (DTG-R) signalling system will all play vital roles in minimising train headways and thereby maximising overall line capacity, whilst also contributing to a reduction in overall energy consumption. The trains also have vastly improved accessibility features such as clear, audible passenger information systems and designated wheelchair spaces (see chapters 1.2, 1.3 and 2.7). The Victoria Line is the

busiest, in terms of passenger volume, on the whole of the London Underground network.

New S stock trains, also built by Bombardier are gradually being introduced on all of the subsurface lines (Circle, District, Hammersmith & City and Metropolitan). Their introduction on to the Metropolitan Line will be complete by September 2012, with the other lines following on up to 2017. The S stock will provide these lines with a common fleet of air conditioned trains and in so doing will facilitate the maintenance and servicing of all subsurface rolling stock. As with the 2009 stock trains, the S Stock also has designated wheelchair spaces on board and clear, audible passenger information systems.

Investment in heavy rail has also been substantial, with the withdrawal of all mark 1 slam door suburban electric Multiple Units (EMUs) at the end of 2005. They have since been replaced on the third rail network by various builds of new sliding door rolling stock, which includes the class 375/376/377 Electrostars built by Bombardier, and the class 444 and 450 Desiros built by Siemens.

3.5 LIGHT RAIL AND BUS DEVELOPMENTS

Light rail disappeared from London in 1951 and trolleybuses followed in 1962. Croydon in Surrey to the southwest of London has a small light rail network, which opened in 2000. London Tramlink serves as a feeder mode, offering good interchange facilities with both bus and suburban rail. The main interchange points are at East Croydon, West Croydon and Wimbledon, where there is also connection with the District Line of the London Underground. London Tramlink also caters for healthy levels of local traffic within South London. TfL took over the running of Croydon Tramlink from Tramlink Croydon Ltd at the end of 2008 and subsequently renamed it London Tramlink, shortly after the takeover was complete.

The Docklands Light Railway (DLR) is the only other light rail system in the London area, linking Bank in the heart of the city of London and Tower Gateway on the outskirts of the square mile, to the rest of Docklands and London City Airport (see chapter 3.4 above). It also provides important links to the busy third rail commuter network of southeast London at Lewisham, and since the 10. January 2009 at Woolwich Arsenal. This new extension involved the boring of two new tunnels under the Thames from the former terminus at King George V close to London City Airport, and has opened up a host of new travel opportunities for people living in east and southeast London. As previously mentioned, the branch to Stratford International, which played a key role during the 2012 Olympics opened on 31. August 2011. The new DLR extension has three new intermediate stations and provides good interchange facilities with London Underground and National Rail at West Ham, as well as a much

needed link between Stratford and Stratford International stations, from where passengers can connect with high speed domestic services from St Pancras International to various destinations in Kent.

DLR differs from London Tramlink by having completely segregated infrastructure, and has fully automated, driverless operation. The DLR franchise is currently run by Serco, who are responsible for the daily train operation, as well as much of the infrastructure maintenance. Both London Tramlink and DLR have good levels of accessibility and have 100% level access between the platform and the vehicle.

Rudolf (2004) reviewed in depth the important role that the bus networks play in Berlin and London. Ken Livingstone began a major programme of investment in the bus network following his election as mayor of London in 2000. This investment programme served two main purposes. Firstly it allowed him to try and meet the shortfall in public transport capacity in London, and secondly it paved the way for him to introduce the congestion charge in central London in February 2003. During his first term in office, Mayor Livingstone introduced a simpler, revised, flat fare structure for London buses. This was further added to in 2006 by the introduction of the Oystercard system, which has subsequently been installed on all TfL Services and on all national rail services within travelcard zones 1-6, i.e. the Greater London Area.

London is currently experiencing major growth in both population and economic activity: “Half a million more people are now living in London compared to fifteen years ago. London’s population is projected to increase by at least 700,000 over

the next 15 years […].” (Rudolf p.1). Rudolf remarked that there will be an increase in passenger demand for all modes of public transport in London over the next ten years. In stark contrast to this rapid growth, Berlin’s bus network is facing a fall in patronage, due to the gradual decline in Berlin’s population over the last ten years which bottomed out in 2006, as well as further reductions in state subsidy. A system of core bus and tram routes known as MetroBus and MetroTram was introduced on 12. December 2004, and has been very well received by the travelling public. Reinhold (2008) described in great depth the concepts which lay behind BVG’s decision to introduce the new MetroBus and MetroTram routes, which were the backbone of a major restructuring programme of public transport services in Berlin, and a streamlining of operations at BVG following German reunification (see Resch 2005).

BVG was faced with the seemingly unenviable task of needing to reduce costs, whilst at the same time increase passenger numbers and thereby revenue. Reinhold likened this to BVG needing to square the so-called circle, but in spite of all the difficulties placed before them, they seem to have been extremely successful in achieving their ultimate aims. “In 2004, new premium products, the MetroBus and MetroTram, were introduced; in 2006, their services were improved yet further. Today, the MetroBus and MetroTram run on the 26 most important lines (in addition to the subway), 24 hours a day, at very short intervals. (…) The new MetroBus and MetroTram products have achieved great success, with passenger volume on some lines rising by more than 30 percent. Overall, the BVG has gained more than 21 million new trips per year and reduced its annual operating costs by more than 9.5 million Euros.” (Reinhold p.57).

The expansion of the MetroBus and MetroTram networks to operate 24 hours a day in May 2006, coincided with a similar expansion of U-Bahn services in Berlin. Reinhold concluded by outlining how the new enhanced services, including the new MetroBus and MetroTram lines, have greatly benefited Berliners by expanding access to good quality public transport services round the clock, which is one of the fundamental aims of the federal transport policy set out by the Berlin senate. Reinhold does not make it explicit however, whether the 30% growth in passenger volume on some of the new Metro lines comprised of wholly new trips, or whether there was a modal shift from the S-Bahn, private car or other non-motorised modes. It is most likely to have been a mixture of the two, with the greater concentration derived from new trips generated from the more frequent services.

3.6 OPERATIONAL STRUCTURES

The operation of the transport network of London is much more fragmented than that of Berlin. The buses and Underground in London are operated by London buses and London Underground respectively, and both of these companies are part of Transport for London. White (2005) analysed the competitive tendering system which has been employed on London's buses since the Transport Act of 1985. This differs markedly from the deregulated bus networks in operation outside the capital, which were being introduced around the same time. "Initially, most bus operations remained under public ownership, but subsequently the bus companies owned by London Transport were privatised in the early 1990s, competing with each other and with newcomers

for service contracts. The process of extending competitive contracting over the whole network was relatively slow, in contrast to the abrupt changes introduced outside London in October 1986. However, almost all services now operate on this basis." (White 2005 p.9).

White (2008) explained that the bus network in London has an almost unique operational structure in Great Britain. "The London system can thus be seen as having parallels with National Express in offering a single integrated network to the user, while enabling a system of competitive bidding to control costs and raise service quality." (White 2008 p.9).

Buses in London have experienced major growth in recent years, especially between 2000 and 2006 (see Rudolf 2004). Several causal factors are attributable to this, but they include: improved service quality, better and clearer information at stops and on vehicles, increased frequency of services including more weekend and Sunday services, together with the major expansion of the night bus network. Since 2006 further improvements to the network have been made, most notably from the point of view of accessibility in the introduction of the iBus system. This provides clear audio and visual information on board the vehicles, similar to that already in use on most Underground trains. It is of particular benefit to many different groups of passengers with sensory impairments, as well as visitors and tourists on the move in London (See White 2009A). The bus networks in both Berlin and London now offer similar levels of accessible on board information, which together with the fact that both fleets are 100% low floor help many disabled travellers to use them as independently as possible (see chapter 1.4).

Schiefelbusch (2005) outlined several issues which he considered to be at the core of public transport service quality. “Typical issues include not only the routing of services, timetables, ticket conditions, design of vehicles and location of stops, but also the development of new service concepts.” (Schiefelbusch p.7). It is worth reiterating that the tendering system does have a great advantage in allowing the transport provider to determine minimal levels of service quality, fare levels and punctuality. They can take prompt and efficient action against the transport operator if these targets are not met during the period of the franchise. The different and often conflicting interests of the transport operators and infrastructure companies of surface and underground rail in London can lead to them concentrating more on achieving their punctuality and performance measures, for which there are financial incentives (see Walton 2007), and neglecting their levels of customer service, but this does depend on how the particular performance measure is defined.

Alexandersson and Hulten (2006) succinctly outline both the benefits and shortcomings of such service contracts for the government. “Service contracts have potential to provide better system operation, allowing the government to obtain improvements in performance and efficiency through technology transfer and the acquisition of technical and/or managerial capacity. (…) The disadvantages of service contracts are that they do not involve significant infusions of private capital, nor do they necessarily create a base from which to optimise entire infrastructure systems. As a consequence, the contractor's effectiveness in improving the service performance is limited by the

government's ability to provide the necessary capital investments and direction." (Alexandersson and Hulten pp.3-4).

The competitive tendering system allows TfL together with the Mayor and GLA to monitor performance and service quality extremely closely, whilst retaining overall control over fare levels and revenue collection on the whole network. They have the power to impose financial penalties on operators who fail to meet the stringent performance targets stipulated in their franchise, and it can be withdrawn altogether if poor performance persists.

The focus in the early years of competitive tendering was to drive down costs, which had escalated in the late 1970s and early 1980s. These included measures such as the introduction of one person operation, in a similar way to the working practices gradually introduced around the same time on London Underground. Newer buses with lower maintenance costs were also phased in, thus reducing the average age of the fleet. Alexandersson and Hulten stated that in theory, the barriers for newcomers into the deregulated bus market should have been low, due to the limited scope of the service contracts, but in reality this proved not always to be the case.

The main problem was, and still is, the shortage of available depot facilities. Many of the former London Transport depots were sold off at the time of privatisation to raise much needed capital, and the ones that remained were leased to, or had been bought by, some of the other larger bus companies, who had already been awarded franchises.

Service quality improvements in the form of greater reliability and more efficient operating systems have contributed significantly to enhanced levels of performance throughout the bus network. The substantial amounts of private capital have not always been available, as Alexandersson and Hulten warned would be the case. The level and speed of any investment programmes are far more reliant on the government making sufficient funds available, either directly or through the Mayor and the Greater London Authority.

The performance regimes on the London Underground and National Rail are much more complex, and can often work at cross purposes to one another (see Walton 2007 and White 2008). White (2008) discussed the complex public, private partnership financing of the London Underground, which began in 2003 and has now [September 2012] been largely superseded. This was a central government policy opposed by the Greater London Authority (GLA), the Mayor at the time, Ken Livingstone, and TfL.

The infrastructure company (infraco) Metronet went into receivership in July 2008, and was subsequently brought back in house by TfL at the end of that year. Tubelines still continues to operate as an independent operations unit of LUL. It is highly likely that in the future Metronet will operate in a similar fashion to Tubelines, i.e. by awarding contracts for work to companies on a competitive basis, and monitoring closely the quality and outcomes of the work.

Walton (2007) explores the difficulties of applying and enforcing quality and service incentive payments in the rail industry, due to the complexity of the internal and operational structures and the differing interests of the various

players involved within the Underground and surface rail. London Underground has no financial incentive to improve performance or increase passenger revenue. This is in stark contrast to the Train Operating Companies of National Rail, all of which have financial incentives strongly linked to their performance.

“In both the underground and surface rail sectors, there are requirements to invest in rolling stock and the infrastructure, but incentives to increase capacity or capability are much greater in the underground sector. Remedies for non-performance against non-financial targets are more robust under the contractual regime in the underground and with TOC franchises in surface rail, than they are under the Network Rail licence. …London Overground falls between the categories of Surface Rail and Underground but has its own performance regime. Customer satisfaction is a key measure in this and there is no farebox incentive.” (Walton pp.1-2).

Walton compared the various operational structures in use within the different rail sectors. Network Rail is controlled by the Office of the Rail Regulator (ORR) and the Department for Transport (DfT). The ORR has a range of measures at its disposal, including financial penalties to deal with poor performance by Network Rail under the terms of its licence. TOCs’ failure to perform can result in them being stripped of their franchise agreements, as happened in the two cases of Connex South Central and Connex South Eastern, between 2001 and 2003.

This is similar to the methods employed with London Buses, as discussed above. There are no financial penalties for performance failures on London

Underground, but the infrastructure companies can have fines levied upon them, if they fail to fulfil the requirements of their contracts. This may also impact on the accessibility of the network with regards to the maintenance and renewal of lifts and escalators at the deep level stations, which affects the whole travelling public, but especially those with mobility impairments (see chapters 1.1, 1.2, 1.4, 1.7, 1.8, 2.2, 2.5, 2.6 and 2.7).

In Berlin the buses are run wholly by BVG. BVG created a subsidiary company BT (Berlin Transport GMBH) (GMBH is the German for limited company), but this has since been disbanded. BT was set up in 1999 to try and drive staff costs down, as BVG is a public company, fully owned by the state of Berlin, and its employees were being paid on a roughly equivalent scale to most civil servants (see Resch 2005).

Gorter (2009) detailed the complex contractual processes which exist between the Berlin senate and BVG. The contract differs from that previously described for TfL in London, because it covers both infrastructure and operations. BVG is the sole operator, licensed in Berlin for the provision of public transport, and thereby commands a monopoly in the city. The current contract runs until 2020 and contains stringent targets on service quality and customer satisfaction (see Schiefelbusch 2005). BVG's performance is closely monitored in a similar way to the various standards set down in the tenders to operate London's bus services, as awarded by TfL.

Gorter concludes that overall the contract seems to work well, and has fostered a good working relationship between BVG and the Senate. "Initially, both sides

had to get used to negotiating, and to clear bilaterally binding commitments. Interestingly, already the negotiation process led to a better mutual understanding of respective positions. Representatives have stated that clear commitments and ‘price labels’ lead to more professional relationship and behaviour. Conflicts on time table priorities, malus payments etc. occur as well, but overall the contract seems to have improved the relationship.” (Gorter p.3).

Pucher and Buehler (2011) analysed in detail the short term and possible long term benefits and negative effects, which such programmes of efficiency savings, cost cutting and increased demands on the workforce may have, both in Berlin and throughout the whole of Germany. “Public transport systems reduced their costs through organisational restructuring and outsourcing to newly founded subsidiaries; cutting employee benefits and freezing salaries; increasing work hours, using part-time employees, expanding job tasks and encouraging retirement of older employees; cooperation with other agencies to share employees, vehicles, and facilities; cutting under-utilised routes and services; and buying new vehicles with lower maintenance costs and greater passenger capacity per driver. Revenues were increased through fare hikes for single tickets, while maintaining deep discounts for monthly, semester and annual tickets; and raising passenger volumes by improved quality of service and full regional coordination of timetables, fares and services. (…) Although the financial performance of German public transport has greatly improved, there are concerns of inequitable burdens on labour, since many of the cost reduction measures involved reducing wages or benefits of workers.” (Pucher and Buehler p.1).

Link (2009) commented on the major organisational and structural changes which have taken place within Deutsche Bahn (DB) and also within the German rail industry as a whole since 1994. “Although the 1994 reforms focussed mainly on DBAG, some measures affected the rail market as a whole. Most important was the vertical separation of infrastructure and operations, and the opening up of the rail network to third parties through payment of track access charges.” (Linke p.39).

The Berlin S-Bahn is a 100% subsidiary of DB (see chapter 1.1) and also pays access charges for operating its services in Berlin and Brandenburg. The charges vary according to the track capacity available on a specific route. The base charge for the Berlin S-Bahn is €2.51 per train-km and the charge for higher use tracks is €3.01 per train-km.

3.7 LABOUR PRODUCTIVITY AND EFFICIENCY

Resch (2005) documented fully the necessary major restructuring which has taken place within BVG since German reunification in 1990. Public transport had been one of the main sources of employment especially in East Berlin, and the market in both the East and West was void of any competition. Resch cited this lack of competition together with the absence of financial constraints as the main reasons behind the inefficient operation of the public transport operators in both East and West Berlin. BVG faced many challenges and difficult decisions, in order to cut its costs, streamline its operations and replace and upgrade almost the whole of its fleet and infrastructure (see Reinhold 2008 and chapter 1.1).

Resch described in detail the various stages of structural change which have occurred in BVG since reunification. “Between 1993 and 2004, labour productivity rose by 109%, manpower was cut by 58% and supply remained constant. In the meantime, subsidies were cut by 44%. The decrease in patronage after the merger can be explained by the fact that car ownership rose dramatically and that the S-Bahn was no longer boycotted. Since 1998, quality efforts by BVG have prompted a 1% annual rise in ridership.” (Resch p.3).

Schade (2003) examined much more closely the dramatic increase in car ownership and the perceived causal factors of the decline in public transport use in the 1990s. He attributed some of this to BVG’s decision to prioritise heavy investment in reconnecting and replacing the U-Bahn infrastructure, ahead of reinstating the tram network and putting in dedicated bus lanes. These would have in his opinion yielded considerable gains in accessibility to the network at much reduced cost. The long delay in rebuilding and completing the S-Bahn Ringbahn, which had been severed during the division of the city is also cited by Schade as another causal factor. The original plan was to have the orbital route reinstated by 1995, but it actually took until Saturday 15. June 2002 to be completed (see chapter 1.1). There was also the fact that around 100 new road links were built between the former East and West of Berlin in the years immediately after reunification, coupled with the heavy increase in car ownership, especially in East Berlin.

The number of cars per 1000 inhabitants in East Berlin was around 200 in 1986, but this rose sharply following the fall of the Berlin wall in 1989, from around 220

in that year to 280 in 1991. In West Berlin the number of cars per 1000 inhabitants was around 350 at the same time, thus giving an overall figure for the whole of the newly reunified city of approximately 320, and it has remained fairly stable ever since (figures extracted from slide 11 in Schade 2003).

There was also a strong migration of people from both East and West Berlin to the surrounding, rural hinterland of Brandenburg. The levels of migration from both sides of the city increased from 3,000 in 1991 to a peak of 20,000 in 1998 before tailing off again (figures extracted from slide 12 in Schade 2003).

These two contributing factors meant that initial modal split targets for the use of public transport compared with the private car were missed. BVG and the Berlin Senate together managed to redress the balance, as Schade later concluded in his article. “The modal split target as the major policy target for transport was clearly missed as public transport ridership declined and car usage increased. The reason seems to be that despite the favouring of public transport by targets the actual policy implementation was fostering car use, e.g. by providing more and faster new road infrastructure, by missing land use planning which fostered urban sprawl. However, it seems that in the most recent years this is recognised and policy changes occurred, e.g. by introducing integrated land planning, catch-up of public transport infrastructure, unified ticketing system.” (Schade p.1).

The following additional figures for the period 1994-2007 were provided by Dr. Ralf Resch of BVG during a face-to-face meeting in Berlin on Friday 11. April 2008. BVG staff were reduced from 21,480 to 11,027 (48.7%), Vehicle-km p.a.

fell from 255 million to 234 million (8.2%) and vehicle/km per employee rose from 11,900 to 21,200 (43.9%). It is interesting to note that the figure given for vehicle/km per employee is broadly similar to the equivalent figure for London. State funding was reduced during this time from €601 million to €308 million (49.4%).

BVG would appear to have been successful in its aims to cut costs, improve labour productivity and increase ridership, and whilst further challenges still lie ahead for the company, they now appear to be in a good position to face and overcome them.

TfL was not faced with the same problems of major inefficiencies in labour productivity as a result of a historical legacy, but nevertheless ways had to be found to reduce costs without having a detrimental effect on service quality and passenger safety. Two main structural changes took place. The first was the introduction of the competitive tendering system for London buses in 1986 (see chapter 3.6 above), which was duly followed by full privatisation in 1994. London Buses were then separated off entirely from TfL, known at the time as London Regional Transport (LRT). A typical bus operation contracted to TfL currently employs 2.5 staff per bus, and each bus covers around 50,000 km p.a. which equates to 20,000 vehicle/km per member of staff. It is interesting to note that Berlin and London have succeeded in achieving similar efficiency gains, but by employing entirely different strategies and opposite levels of financial support. Berlin has almost halved its levels of funding to €308 million in 2007, whereas levels of financial support in London have risen from extremely low

levels in 1999 to a peak of £600 million in 2008 (all figures on London supplied by Peter White in his comments on a previous draft of this chapter).

One of the main changes in working practice on the Underground was the gradual abolition of two-person operation on the trains. The Victoria Line had been one-person-operated from its inception in 1968. All the other lines required a guard, whose primary tasks were to open and close the train doors and to see the train safely out of the platform. With the advent of platform mirrors, cameras and latterly on board monitoring VDUs built in to the drivers' consoles of newer generations of rolling stock, the conversion to full one-person-operation was only a matter of time. It began in the mid-1980s with the District and Metropolitan Lines and the role of the guard finally became obsolete in early 2000, with the withdrawal of the last 1959 stock trains on the Northern Line.

Alexandersson and Hulten (2006) elaborated further on Resch (2005) by examining the necessity for competition within the public transport sector. They detailed the two different sorts of efficiency which can be achieved given sufficient time. "One must also consider the distinction between productive and allocative efficiency. Competition generally fosters gains in productive efficiency, for example through increased labour productivity, while a transition to a state of better allocation of resources and optimum output may be less straightforward and take longer time." (Alexandersson and Hulten p.2).

In the case of London Buses as detailed above, the transition to a system of competitive tendering and subsequently full privatisation from 1994 did bring with it many productive efficiency gains, including lower maintenance and

operating costs, a consolidation of depot resources, technical expertise and manpower, including better crew scheduling practices and the full conversion to one-person-operation (OPO) by the end of the 1980s. BVG had to undergo a programme of major internal restructuring post-reunification including massive reductions in its labour force. The fact that the figures of bus vehicle/km per staff member are remarkably similar, would seem to infer that both cities have succeeded in achieving good levels of productive efficiency, but are undoubtedly still striving to make further future efficiency savings.

Gains in allocative efficiency are more difficult to identify, because they take a longer time to become apparent. Allocative efficiency is a method of allocating resources to maximise benefits. As far as public transport is concerned, this may mean investing in projects which offer time savings expressed in monetary terms and thus have a significant cost benefit ratio. It is a means of taking the longer term, broader picture into consideration when planning financial investment and operating expenditure for a public transport network.

From the point of view of accessibility, this may mean striving to achieve optimal staffing levels on the network, to be able to offer assistance to passengers whenever required and respond to unforeseen circumstances quickly such as lengthy periods of unforeseen service disruption. Numbers of staff present on the network have to be balanced against financial budgets available to the transport operator. Automated information and help points need to be provided at unstaffed stations, so that passengers can obtain information or summon assistance should the need arise. All these things have a profound effect on passengers' perception of safety and security whilst travelling, as well as

enhancing levels of self-confidence and independence amongst disabled travellers.

Adeney (1997) made some interesting comparisons between London Underground and BU (Berliner U-Bahn). At the time Adeney conducted his research in 1997, BVG was split into several separate operating divisions, but not on a line-by-line basis as in London. He noted that London Underground also implemented a major programme of restructuring in the late 1980s and early 1990s, in an attempt to cut costs and make LU more customer-focussed. The underlying motivation for these changes was described by Adeney as:

"• the need for staff to have a clearly identified 'boss' rather than the somewhat blurred reporting arrangements under previous structures;

• the need to sharpen accountability for income and operating costs."

(Adeney p.2).

Adeney noted that such things as revenue through ticket sales were retained centrally and the maintenance of non-railway infrastructure i.e. escalators, lifts and ticket machines still remained the responsibility of the relevant infrastructure division. He concluded by stating that London Underground seems to have been more successful in its objectives of structural reform and improving accountability for various aspects of its performance. "It is in this area of accountability that LUL is superior to Berlin. The driving force behind the changes and process of modernisation in BU is the new European Union competition law that comes into effect in the year 2000. Whilst this is unlikely to affect BU as much as the Omnibus division, it has acted as a catalyst to stimulate considerable thinking and change within the division." (Adeney p.4).

The financial structures have been superseded since Adeney's research more than a decade ago, most notably in London, with the introduction and subsequent demise of the Public Private Partnership (PPP) on the Underground (see Ball 2001, Wolmar 2002, and White 2008B). Adeney still made some useful comparisons between the methods of funds allocation in both cities, and neatly illustrated the positive and negative aspects of each system and their implications for the respective public transport operators. "LT receives its funding from the DoT in the form of an annual settlement. LT presents a three year spending plan to the Secretary of State who considers it and then decides on the level of funding for the coming year, and projected funding for the following two years. Finance is allocated to BVG in a number of ways and from several sources. Traditionally, the funding of local public transport has been the responsibility of the different Federal States (Bundesländer)." (Adeney pp.4-5).

The descriptions of the procedures in London are still broadly similar, although the DoT has now been replaced by the DfT and LT has become TfL. The Greater London Assembly (GLA) and the current Mayor, Boris Johnson, also have a significant role to play in deciding on fare levels and how funds from the DfT and central government are spent.

The contract with the state of Berlin allows BVG much greater flexibility to plan ahead and budget for larger infrastructure investment programmes than is possible in London, as they have a clearer idea of the level of funds which will be available to them in future years. They are also able to borrow money at preferable rates from the state for large scale investment programmes.

3.8 CONCLUSION

This chapter has aimed to give a comprehensive overview of the key broader issues surrounding accessibility, which is the main theme of this research study.

The greater role of cycling in Berlin than in London is one of the most interesting and striking differences between the two cities (see chapter 4.6 and appendix A). There appear to be several reasons for the higher modal share of cycling in Berlin, and these range from safe storage facilities at many S-Bahn and U-Bahn stations, as well as specially designated areas on S-Bahn and Regional rail trains themselves, to the ideal, flat topography of Berlin and the surrounding area.

The overall structure of the public transport network is vital to providing good quality services for its users. Orbital rail routes such as the Ringbahn in Berlin and the Circle Line and future Overground orbital rail route in London play a key role in keeping the capital cities moving.

The bus network in London on the other hand fulfils the function of linking together the many outer suburbs, as the city is surrounded by several urban business and population centres, and around three quarters of the bus journeys in London occur in zones 2-6. These patterns of usage are in sharp contrast to those in Berlin, which is a relatively compact city with a fast rail network carrying high passenger volumes (see UITP 2007 p.15). The role of rail is therefore relatively more important than in London, where bus takes a higher share of the

total public transport market (see chapters 1.1 and 4.35). Berlin is also surrounded by low density, rural areas of Brandenburg, as opposed to the high density, commuter suburbs of London.

London buses have experienced massive growth in patronage since 2000, due to an increase in service provision and growing population, whilst in Berlin the opposite scenario applies. Subsidies for public transport are being reduced against a backdrop of a declining population. BVG needs to work hard to retain existing passengers and attract new ones on to the buses. MetroBus and MetroTram routes have since 2004 certainly helped them in achieving their goal (see Reinhold 2008).

Both cities now have a 100% low floor bus fleet, which makes bus an extremely accessible mode for many travellers with various disabilities. Different operational structures are currently in use however; the competitive tendering system in London, where routes are subcontracted out to private operators by London Buses, a subsidiary of TfL is in stark contrast to the system of direct operation by BVG in Berlin, who hold a strong monopoly in the city for the provision of public transport services. There are perhaps greater parallels between the structures employed on the underground networks, now that the PPP has all but disappeared in London. BVG and London Underground both have direct control of their networks; however an element of vertical separation still exists in London. Infrastructure maintenance is carried out by two dedicated infrastructure companies (infracos) i.e. Metronet and Tubelines, although Metronet has now been brought back in house by TfL.

Public Transport in both Berlin and London aims to fulfil the function of a social service (see Vuchic 1999, and Bagge 2008). It enables people who do not have access to a car or who are disabled, elderly or on a low income to access essential facilities such as shops, jobs, medical and health services relatively easily. This is a particularly acute need in many of the eastern boroughs of Berlin and London, where there are higher than average levels of low income, unemployment and social exclusion (see Lucas 2001 and Lucas 2012). They are therefore heavily reliant on the provision of good public transport services to cater for their individual mobility needs.

The next chapter will concentrate on the analysis of various crosstabulations conducted using the MiD 2002 and NTS 2002-2008 data sets and the numerical outputs from these tests can be found in appendix A of the study.

CHAPTER 4

COMPARATIVE ANALYSIS OF HOUSEHOLD SURVEY DATA

INTRODUCTION

COMPARISON OF THE MOBILITÄT IN DEUTSCHLAND AND NATIONAL TRAVEL SURVEY DATA SETS

The idea of the MiD study was to obtain a representative picture of travel behaviour in the unified Germany, following Kontiv surveys in West Germany in 1976, 1982 and 1989. The MiD data was designed to be directly comparable with previous Kontiv data.

The National Travel Survey (NTS) in Britain is carried out in order to monitor long-term changes in travel patterns and provide a better understanding of the use of transport facilities made by different sectors of the population.

The first NTS survey was commissioned by the Ministry of Transport in 1965 with further periodic surveys being carried out in 1972/73, 1975/76, 1978/79 and 1985/86. NTS has been conducted continuously since 1988.

SAMPLING METHODS AND DATA COLLECTION

MiD2002 drew its sample from the list of registered addresses, which included people living in institutions. Children were also included and a special questionnaire was given to those under 14 years old. It was intended to interview personally everyone in the household aged 14 years and over. Between the ages of 10-13, the parents were able to decide whether the children would be interviewed themselves or whether they would act as proxy for them. The main surveyed person in the household had to be over 18, and was the one who had most recently had their birthday, prior to the survey day. Questions about reduced mobility due to a disability were only asked to those people answering themselves. MiD2002 also included foreigners, who had been excluded in previous surveys. They represented about 9% of the population (1999 statistics). Turkish people were the largest group and so a Turkish translation of the questionnaire was sent with the German translation, to overcome any potential language barriers. Turks could also have a telephone interview in their mother tongue, but this wasn't taken up by any of the survey respondents nationwide.

In the NTS individuals in sampled households are interviewed face-to-face to collect personal information, such as age, gender, working status, car access and driving licence holding. They are also asked to complete a seven day travel diary and provide details of trips undertaken, including purpose, method of travel, time of day and trip length. The NTS differs from MiD in that it only includes residential addresses and so does not survey people living in institutions or students living in university halls of residence. NTS collects data

from all age groups. Parents or other relatives obviously assist younger children to complete their travel diaries, but all the responses are duly consolidated into a single data set. A total of 7736 respondents are shown for the NTS 2002-2008 aggregate data for London; assuming a typical response rate of around 60%, although it is likely to have been less than this in London, the number of people initially contacted by NTS would have been around 13000.

In MiD the main method of data collection was over the phone (CATI) with a paper/face to face interview used as a supplement. Households were notified in writing that they'd been selected for the survey and were contacted by phone shortly after this. Provided that they then wished to continue participating in the survey, individual travel diaries were printed up and sent to them. They were reminded the day before their randomly selected survey day that they had to complete the travel diaries (special ones were produced for children under 10) and they were then contacted between 1 and 14 days afterwards, in order to complete the interviews. The 'people' and 'trip' interviews were conducted with everyone over 14. The desired person was only substituted if they weren't going to be at home in the coming week or if they were under 14 years old.

Families for whom a phone number couldn't be obtained were sent a questionnaire through the post (Haushalt survey). If they then supplied their phone number with this information, the rest of the interviews were conducted over the phone. If no phone number was provided, they were sent the 'persons' and 'trips' questionnaires by post and a reminder letter shortly before the survey day.

The methods of data collection used by NTS differ considerably from those employed by MiD. Prior to the interviewer's first call letters are sent out to the sampled addresses. These introduce the survey and explain that an interviewer will call. The interviewer then arranges an appointment for a 'placement interview'. During this visit, the interviewer obtains information on the household, each household member and on all vehicles to which the household has access, via a computer assisted personal interview (CAPI). The procedures for the seven day travel diary record are then explained. Each household is given a randomly assigned start date for the seven day travel diary.

The placement call is generally followed by a reminder call, just before the start of the travel week, to remind the household to begin their travel records, and by a midweek call during the travel week to check that records are being completed correctly. Within six days of the end of the travel week the interviewer will make a 'pick-up call' to collect the travel records and to check the information recorded with the informants.

DIFFERENCES IN DEFINITIONS

In MiD a journey is the main unit of travel which includes start point, destination, and reason for journey, transport used, duration and distance travelled. A journey is characterised by its purpose and destination.

The MiD survey days are picked at random for each household and are spread out over the duration of the survey (in the case of MiD 2002, this was between 7. December 2001 and 22. December 2002). Whilst the definitions of journey,

mode and purpose are roughly comparable in the British NTS, a key difference is the fact that NTS collects data for seven consecutive days, rather than one survey day. The MiD survey day and the NTS seven consecutive day period are spread throughout the year including weekends and holidays, in order to detect any subtle changes in journey patterns caused by exogenous factors such as seasonality. In NTS, short walk trips were only recorded in the travel diary on the seventh day of the survey week.

Long distance journeys in MiD2002 are defined as those which had at least a one night stay attached to them, but no minimum distance was stipulated. They were also categorised according to their purpose e.g. business, private journey (with up to a three night stay) etc. Long distance journeys were counted in the last three months and the main mode of transport used was also recorded. The number of long distance journeys which had been made in the last three months was simply added to the journeys made on the survey day itself. This practice duly led to some oddly high trip rates reported in the survey.

In NTS a trip is defined as a one-way course of travel having a single main purpose, e.g. a walk to school or a trip to work without any break in travel. The respondent is usually clear what the single main purpose of a particular trip actually is. Sometimes people go out for a number of reasons or go out for one main reason, but carry out a number of different activities perhaps at different places. Complex travel like this is broken into separate trips so that the data can be analysed. Where a stop is entirely secondary to the main purpose (such as a stop to buy a newspaper on the way to work), the stop is disregarded.

A trip consists of one or more stages. A new stage is defined when there is a change in the form of transport or when there is a change of vehicle requiring a separate ticket. NTS also collects data on journeys where there is a change of vehicle, but where no separate ticket is issued i.e. making several bus journeys in London on a travelcard. These bus boardings are not normally shown in published data however.

In order to reduce the burden on respondents, travel involving a number of stops for the same main purpose and using the same form of transport are treated as one continuous series of calls trip from the first such call to the last one. Only shopping and ‘in course of work’ travel can be treated in this way. A doctor’s round could therefore consist of one trip to the first patient, one series of calls trip to the other patients and one trip from the last call back to the surgery or home.

The definition of long distance trips used in NTS is one way trips of over 50 miles/80 kilometres, which is irrespective of whether an overnight stay is involved. As well as the seven day travel diary, respondents are also asked to make a note of long distance trips from the previous week.

In trip chains which only consist of one outward and one return stage, the purpose of the outward journey is also counted for the return stage. In trip chains with several stages, the purpose of the return stage is attributed to the purpose already mentioned with the highest ranking in the following list, with the highest ranked first: journeys to and from place of work, journeys to and from

place of education/school, trips as part of your job/business, escorting other people, private/personal errands, shopping, free time, anything else.

SAMPLE SIZES AND COMPLETION RATES

The overall sample size of MiD was 25000 households, so that a representative pattern of travel could be obtained for each German federal state ‘Bundesland’. 1300 households were selected in Berlin. In London the combined sample size for 2002-2008 was 7736 households. This means that the sample size each year was around 1100 households, which is very similar to the sample size of the MiD 2002 data set.

In the MiD written survey, details for a maximum of seven journeys were requested and any additional ones on the survey day were just noted in number. The phone survey required the details of eight journeys and then just the number of any subsequent ones. MiD distinguishes between the journeys made by people for whom driving is a part of their job, i.e. bus/train driver, taxi driver or delivery driver, as opposed to business journeys made as part of your job, which doesn’t itself involve driving.

The modes of transport used on a journey have been listed according to a predetermined order. In the written survey, the number of escorts/passengers in the car was asked for, whilst in the phone survey the precise identity of any escorts/passengers was asked for. This led to a reduction in the number of forgotten journeys, but journeys had to be confirmed by everyone who was deemed to have made them. For every journey the address had to be given and

if the start point wasn't the respondent's home, then this had to be given as well.

During the phone interview, the respondent was asked firstly to summarise all the journeys they'd made and then they had to go through them in turn and give more precise details. This often helped to include short non-motorised trips, which tended to get forgotten. The interviewer was then able to recognise whether return trips had been forgotten and could deliberately ask about these during the interview; such little reminders were not possible in the written survey.

The summary of daily trips was also used to cross check with the reports from the other respondents in the household. Any journeys which they didn't remember or confirm were deleted from their responses.

In order for a household to be considered as having participated, responses for the 'people' and 'trips' interviews had to be received from at least half the members of the household. Around 72% of households surveyed fulfilled this so-called 50% rule and about two thirds of households gave a 100% response rate. The 50% rule was developed to avoid under representing larger households.

The NTS response criteria are also far more strict, as only households with a 100% response rate are included, i.e. those households from which travel diaries are obtained from all household members and not just 50% or more as in MiD.

The number of households actually surveyed in Berlin was 1354 from a desired sample size of 1300, which equals 104.2% and for the surrounding region of Brandenburg the figure was 1045 out of 1000 equals 104.5%.

It is unclear why more households were surveyed in Berlin than its allocated sample size. The response rate of 104.2% may have introduced an element of bias into the results, as it was more likely to have picked up people who were usually at home during the day. This may well have overrepresented unemployed people, housewives or the elderly, and conversely underrepresented full time workers. The extensive use of telephone interviews by MiD may also have contributed to a higher response rate in Berlin, as participating in a telephone interview may well have been much less effort for the respondent rather than in the NTS, where each respondent had to complete the travel diary in hard copy and then engage in a face to face chat, when an NTS representative called to collect the travel diaries.

It is not made explicitly clear by MiD, as to how and when the additional households were contacted. It might be that a greater number of households were initially contacted to ensure the Berlin sample size of 1300, but it is also possible that a substitute household was only selected, when one of the original sample of 1300 could not be contacted for whatever reason. If contact was then established with the household from the original sample, then the results from both the original and the substitute households were collected. This is in stark contrast to the NTS sampling method, where the attained sample is about 60%, as opposed to over 100%. This is based however on repeated attempts to

contact the selected household from the random address sample rather than selecting substitute ones.

4.1 COMPARATIVE CROSSTABULATIONS

A series of crosstabulations were carried out using the aforementioned data sets. The MiD 2002 set was selected, as it was the most recent full data set available at the time when the research was being conducted. As many of the figures as possible have since been compared with the equivalent figures listed in the summary report of MiD 2008. They were all found to be either identical or very close, suggesting that any changes which may have occurred in the interim were only minor in nature and the MiD 2002 results are still valid and have thus been retained.

The NTS 2002-2008 combined data set for London was only available in this aggregated form. As was previously explained, although the total is for seven years combined together, the annual sample size is roughly equivalent to that of the MiD 2002 data set and on this basis, the two data sets can safely be compared.

The table of figures and statistical tests, where appropriate, are detailed in appendix A of this study. Frequency distributions were analysed and in some cases hypotheses were tested using the chi squared test. Highly significant is at the 1% level and significant at the 5% level.

In appendix A, the three letters in brackets after the number of the crosstabulation denote which data sets were used in the calculation. (MiD) = Mobilität in Deutschland 2002 and (NTS) = National Travel Survey aggregated between 2002-2008. The data sets used in each crosstabulation are mentioned by name at the start of the respective commentary in this chapter for absolute clarity.

4.2 AGE RELATED CROSSTABULATIONS

Crosstabulations 4.21-4.25 were conducted using the MiD 2002 data sets and crosstabulate age with a number of other variables.

4.21 AGE AGAINST NUMBER OF TRIPS PER DAY

The number of trips per day (including longer trips made within the past three months) was simplified into 1-4 trips, 5-8 trips and 9 or more trips. MiD defines a trip as a journey comprising of one or more stages from origin to destination (see above). It also counts short non-motorised trips.

The null hypothesis for this test was that the number of trips made by an individual per day was not dependent on their age. The result was highly significant with the older group 65+ typically making fewer trips. 562 respondents reported making 1-4 trips per day, which was slightly higher than the expected count of 523.2. For the categories 5-8 trips per day and 9 or more per day, the observed count was less than the expected one.

Older people tend not to make any work related journeys anymore and may well be physically less active. Old age is often also accompanied by some kind of physical impairment, which can greatly impact on the ability of an individual to get around independently (see chapters 4.46, 4.47 and 4.51 below). It should be pointed out though that the inclusion of longer trips made in the last three months has distorted the overall trip rates to some degree, as there is an implausibly high proportion of respondents reporting having made 9 or more trips on the survey day.

4.22 AGAINST MODE USED ON FOOT

The null hypothesis for the tests 4.22-4.25 inclusive was that the age of the recipient had no bearing on the mode used to complete their journeys and each of the tests showed a highly significant result. In the working age group (25-49), the number of people who made no journeys on foot is markedly higher at 1735 than the expected cell count of 1535.8. This may be to do with the high public transport use in Berlin coupled with extensive use of the bicycle, especially for shorter trips. Another contributing factor to the lower share of trips on foot by the 25-49 age group is the higher car ownership in this group and the trips they do make, e.g. the daily commute to and from work may well be longer than average and so are less suited to non-motorised modes.

4.23 AGAINST MODE USED BUS

In the two youngest age groups, the observed count for using the bus is higher than the expected counts for these cells. This is likely to be down to trips to and from places of education.

The oldest age group 65+ are more likely to use the bus as a transport mode due to lower car ownership and concessionary fares.

All registered disabled people in Berlin receive a free concessionary transport pass, very similar to the Freedom Pass in London, which is valid not only on buses, but on Trams, U-Bahn, S-Bahn and regional rail services too.

Everyone over 65 is also entitled to receive heavily discounted fares on all of the aforementioned transport modes, but this is usually in the form of a yearly season ticket, which has to be applied for and purchased (see chapter 1.6).

The working age group is less likely to use the bus due to higher car ownership, use of rail-based modes e.g. commuter trains or the S-Bahn and higher levels of income.

4.24 AGAINST MODE USED UNDERGROUND OR TRAM

In the youngest age group 0-15, there is a slightly lower than expected use of underground and tram, perhaps due to households living further out from the city centre in the western suburbs, where there are no tram services and the S-Bahn or bus are the main feeder/distributor modes. This age group does tend to make shorter trips however, i.e. to and from school.

In the age group 16-24, there are a lower number of people who do not use the underground/trams than is expected, but conversely there are a higher number of people using it to make their journeys across and around Berlin. There’s also a higher than expected number of users from the working age group, who use the underground as part of their daily commute to and from work.

4.25 AGAINST MODE USED S-BAHN AND COMMUTER TRAIN

There is far lower than expected use from the youngest age group, but the reverse scenario is true of the 16-24 age group, where the level of usage is just over double the expected count (91 versus 44.7). S-Bahn/commuter train is likely to be used to travel to and from education establishments and possibly the place of work for people at the upper end of this age range, as well as evening entertainment venues, which are often located in the more central parts of the city. This typically means that journey lengths tend to be longer, especially when a commute to and from work is involved. They also have lower access to a car and some of them will even be too young to hold a driving licence.

4.3 HOUSEHOLD SIZE CROSSTABULATIONS

Crosstabulations 4.31-4.33 and 4.35 were conducted using the MiD 2002 data set and crosstabulation 4.34 was conducted using the NTS 2002-2008 data set. In commentaries 4.31-4.34, only basic frequencies are discussed.

4.31 AGAINST AGE

There are only 50, one person households in the 16-24 age category, as young adults are still likely to be living at home, whilst they finish their education and then look for full time employment. Conversely there are higher than expected numbers of these age groups living in the four person households. This would suggest that the household is a small family and has a mixture of adults and children.

In the oldest age group 65+, the count peaks very strongly at the two person level 719 out of a total of 2780 which equals 25.9%. This suggests that there are a lot of older people living on their own, or older couples whose children have now grown up and left home.

The numbers of three and four person households sharply reduce, as it's highly unusual to have more than two elderly people living together in the same household. Household size of 6 plus persons mainly comprises of the youngest two age groups, depicting families with several children or possibly a shared house full of students.

4.32 AGAINST NUMBER OF CARS

The one person households are far more skewed towards zero car ownership than larger household sizes, as might well be expected. The percentage of people in a 1 person household without a car in Berlin = 59% (400/679). This is incredibly similar to the equivalent figure for London, which is 61% according to the NTS 2002-2008 data.

The same can be said for the figure for 3-person non-car owning households, which in Berlin is just under 14% (59/432). In London the figure for 3-person non-car owning households is 16% according to NTS 2002-2008 data. This size of household is far more likely to own at least one car.

Four person households are far more biased towards two or more cars, most likely representing a typical family structure with a mix of adults and children.

4.33 AGAINST AVAILABILITY OF A CAR

The commentary here directly compares the findings from crosstabulations 4.33(MiD) and 4.34 (NTS), which is entitled “HOUSEHOLD STRUCTURE AGAINST CAR OR LIGHT VAN AVAILABILITY”.

People living in a one person household in Berlin are far more likely to have no access to a car, which is supported by the known relatively low car ownership in Berlin per 1000 population and the high use of cycling and public transport as alternative modes. This may well be correlated with age too, as older people, e.g. pensioners, are more likely to live on their own and in smaller households than younger age groups. The observed count for having no access to a car is almost double the expected count, but conversely the observed count of people who constantly have access to a car is considerably lower than the expected count for the one person household.

In London, a similar trend can be observed. The single adult household is far less likely to have a car available than the sample as a whole. One notable difference between the data sets though is that in London this seems to apply to all ages and not just the 65+ category as in Berlin. A causal effect may well be high density accommodation e.g. blocks of flats, where single person households are more likely to reside.

In Berlin, the observed cell count for two person households occasionally having access to a car is slightly less than the expected count and this is also the case for four person households. This is to be expected in larger households, where there are more people than cars, although there will inevitably be members of the household who don't drive due to their age. These are most likely to be children.

In London, the categories concerning typical families with children are far more likely to have at least one car available in the household. The single parent family appears to bear a similarity to the single adult category with a substantially lower observed level of vehicle ownership than the expected figure from the sample as a whole. This is almost certainly tied in with low income, lower car ownership and good public transport provision in London. Recent data published by the Office of National Statistics (ONS) confirm this to be a national trend rather than one specific to London and the southeast (see ONS 2011).

The number of four-person households in Berlin with no access to a car is well below the expected count, but the observed count for 6-person plus households is almost the same as the expected count, although there are only 34 such households in the sample. It is possible that the greater number of children present in larger families is in turn responsible for the higher number of non-drivers in larger households, which may also have a bearing on both these crosstabulations.

The general trend displayed in both Berlin and London appears to be that as household size goes up, the probability of having access to a car substantially

increases. This is most pronounced for household sizes of three and four persons. The reverse scenario appears to be true for five and six person households i.e. the observed count for having no access to a car is considerably less than might be expected.

4.35 AGAINST DISTANCE TO THE NEAREST BUS STOP AND RAILWAY STATION IN MINUTES

The commentary here directly compares the findings from crosstabulations 4.35(MiD) and 4.36 (NTS), which is entitled “HOUSEHOLD STRUCTURE AGAINST WALK TIME TO BUS STOP”.

In this commentary, only cumulative percentages are discussed.

84% of Berlin households in this sample live within 14 minutes of their nearest bus stop and 79.8% live within six minutes, which would be expected for a city with a very extensive public transport network. The last few categories were combined into ‘15 or more minutes’, as the numbers typically reported were extremely low. It is also highly likely that the level of access to both the bus and rail networks have improved further since 2002 when this data set was collected.

In London 88.3% of households live within 6 minutes of their nearest bus stop, which is about 10% higher than the figure for Berlin. There may be several reasons for this, but one of the main ones is that London has a denser network

with more stops and frequent services, as it's catering for over double the number of people than Berlin.

The category single adult 65+ is less likely to live within 7 minutes' walk of their nearest stop than the sample as a whole. This appears to be a little surprising, but may well be a function of a lower walking speed of more elderly individuals. Single adult 16-64 and single parent families are slightly more likely to be within a short walk of 6 minutes or less, which may well be as a result of living in high density accommodation such as inner city blocks of flats, and some individuals having a higher than average walking speed. Recent social trends reports published by the office of national statistics (ONS) also confirm high levels of public transport use by single parent households (see ONS 2011).

The average stop spacing in Berlin for the bus network is 0.48 km, for tram 0.46 km and for U-Bahn 0.79 km (see BVG 2008).

Assuming an average walking speed of 80 metres per minute, 6 minutes would equal 480 metres; in other words 79.8% of the MiD 2002 sample reported being within approximately 480 metres of their nearest bus stop, which still represents a very good level of access and corresponds to the reported average bus stop spacing in Berlin, as stated by BVG.

Older residents who may well live in high density blocks of flats will typically report a greater distance to their nearest bus/tram stop or railway/underground station due to their slower walking speed. Another explanatory factor for this difference may well be a high density of elderly people living in East Berlin,

which is very well served by tram and S-Bahn, but where there are no parallel bus routes in the near vicinity.

72.6% of the MiD sample live within 14 minutes of their nearest railway station, which roughly corresponds to one kilometre in distance. It is assumed that both S-Bahn and U-Bahn stations have been counted together. This represents a good level of rail access, which one would expect for a city such as Berlin.

In the NTS 2002-2008 data set, information about access times to rail stations was not included. Such data is however collected in the NTS, although not published every year. The most recent data available was that from 2007, which showed that 13% of London residents were within 6 minutes' walk of a railway station (Underground or National Rail), and a further 24% within 7-13 minutes' walk. This makes a combined figure of 37% compared with the Berlin figure of 72.6% within 14 minutes cited above (see table 5.2 in DfT 2008B).

This is a surprisingly low figure, which may be partially explained by the lower levels of housing in central London as opposed to Berlin. London residents in the inner and outer suburbs may well have a longer journey to their nearest station, which might also involve the feeder modes of bicycle, bus or even private car.

4.4 TRIP FREQUENCY AND TICKET TYPE CROSSTABULATIONS

Crosstabulations 4.41-4.47 were conducted using the NTS 2002-2008 data set and crosstabulate first ticket pass use against first ticket pass type for a number of different sorts of ticket or pass. Weighted averages have been used to estimate the trip frequency in all these crosstabulations. Categories of less than once a week have been combined and they represent 1 trip. For all other categories up to 21 or more times a week, the middle value has been used, i.e. for three to four times a week, the value of 3.5 has been used. For 21 or more times a week, an assumed average of 28 times, which equals 4 times a day, was used.

4.41 FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE (SEASON TICKET)

Season ticket use in this sample is concerned primarily with the mode of rail and occurs at least once a week. Only one respondent indicated using their ticket less than this. These results fit the known pattern, that the far higher initial outlay for a season ticket warrants the user making more journeys with it, as the journeys are at a zero additional cost to the initial outlay. The average weekly season ticket usage is around 10-11 times a week in the London area.

One thing to note is that the NTS asks participants to indicate their typical ticket or pass use. Because the survey is spread over the whole year, it may be that some participants holding season tickets had a survey week which fell during the Christmas and New Year period or during their summer holidays, when they

were making far fewer trips than normal. This may cause some minor variations in levels of usage, but it is done to detect subtle variations in travel patterns displayed through the whole year.

4.42 (AREA TRAVELCARD)

The area travelcard shows a similar trend to the season ticket, but encompasses both rail based and bus modes and encourages the user to make a higher number of journeys than would be typical with other types of ticket. It is interesting to note that the weighted average shows a slightly lower level of usage than that of the season ticket, when the opposite may well have been expected. This may be because a travelcard allows the user to make short bus feeder/distributor trips as well as the longer trips typically by train, as demonstrated by the season ticket above. It may also be due to the fact that NTS only counts the main mode used for a journey.

The role of the paper travelcard is gradually being replaced by smart cards e.g. the Oystercard in London, on to which a travelcard can be loaded electronically. A pay-as-you-go top up ticket can also be loaded on to the same oystercard for journeys, which extend beyond the boundaries of the travelcard. Smart cards give much more precise data as to the exact origin and destination of trips, as well as overall levels of pass use. For further discussion and analysis of smart card data (see White, Bagchi and Bataille 2010).

4.43 (COMBINED SEASON TICKET)

The combined season ticket shows similar trends and a similar frequency of average use to those already described above for season ticket and area travelcard. The category itself is a little strange, as usually one season ticket is purchased rather than a Train Operating Company (TOC) season ticket plus a zone 1 season ticket for the short feeder and distributor trips made by underground.

4.44 (SCHOLAR PASS)

Scholar pass is most likely confined to the mode of rail and shows a high frequency of use around 9-10 times a week, which would be expected with 5 return trips to and from the place of education being made. Although these journeys would only be made during term time, the respondents are presumably recording this term time average in the survey.

4.45 (EMPLOYEE PASS)

The employee pass is also mainly concerned with rail usage and shows fairly high levels of use for all of the listed frequency categories as one might expect, with people making regular journeys to and from work, both during the week and to a lesser extent at weekends, according to their shift patterns.

4.46 (OLD AGE PENSIONER (OAP) PASS)

The Old Age Pensioner (OAP) pass encompasses both rail-based and bus modes and depicts the opposite trend to that previously described for season tickets i.e. there is substantial reporting of very low levels of use, highlighting the lower numbers of trips made by elderly people in general, possibly only once or twice a week to do the shopping. It is also worth bearing in mind that there is typically no initial charge for the issue of the OAP concessionary pass, so even people who make very few journeys in a year still find it worth applying for and taking it up.

4.47 (DISABILITY PASS)

Concessionary and disabled pass encompasses the same modes as the OAP pass detailed above. Travel shows both high levels of low use, as well as high levels of far more regular use. These variations are most likely attributable to the specific physical or sensory impairment of the pass holder, which will dictate the degree of impact that it has on their level of mobility. The average trip rate for holders of disabled passes appears to be slightly higher than that of OAP pass holders. This may well be because at the time when the data was collected, there were tighter restrictions on the use of an OAP pass (only after 09.30) whereas the disabled pass could be used at any time. The restrictions on OAP use have subsequently been lifted and now both types of pass are valid in London on all TfL modes at all times, but only after 09.30 on national rail services within the Greater London Area.

4.5 DISABILITY RELATED CROSSTABULATIONS

Before discussing some crosstabulations concerning disability, it's necessary to examine the definition of disability as used by both MiD 2002 and NTS 2002-2008, in order to establish how comparable they are.

"In MiD 2002 disabled people over 13 were questioned for the first time. For two thirds of the sample, their disability (according to them) represented an impairment to their overall mobility. 75% of people with a walking impairment found their access to transport affected, but only 50% of visually impaired people felt similarly restricted in their freedom to move about. In comparison people who have an officially registered mobility impairment represent a smaller proportion of society. They typically encounter frequent obstacles to participating in activities in their local area." (MiD 2002 Ergebnisbericht (report on key findings) p.2).

The NTS definition can be summarised as follows. "In 2005, there were some changes to the questionnaire. The previous questions on accessibility were replaced with a new set which were designed to be in line with the Department's accessibility indicators. Some questions about the use of powered wheelchairs and powered scooters were added for respondents who said they had difficulties going out on foot." (NTS Technical Report 2005 p.19).

Although the MiD 2002 and NTS 2005 definitions of disability aren't wholly comparable, they both do note the fact, that some kind of physical impairment does restrict the mobility of an individual. This is most pronounced amongst

those people who have some kind of walking impairment; 75% of these in the MiD sample reported encountering barriers to accessing and using public transport. Two thirds of the sample as a whole reported having some kind of physical or sensory impairment, which impacted on their level of mobility.

NTS in Britain introduced a new set of questions on accessibility in 2005, which complemented DfT's accessibility indicators used for measuring and monitoring registered disabled people's journey patterns. It is interesting to note that these revisions also included recording short trips made by powered wheelchairs and scooters by those who had difficulty with walking. It should be noted that the changes implemented by NTS in 2005 come only half way through the aggregated period of 2002-2008 of the data set used in the crosstabulations.

Crosstabulations 4.51-4.54 were conducted using the MiD 2002 data set and crosstabulation 4.55 was conducted using the NTS 2002-2008 data set.

4.51 DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST AGE

The null hypothesis was that age had no bearing on physical disability being an impairment to mobility and the result was highly significant. There appears to be a strong correlation between age and disability. In the 65+ age group, the observed cell count for the number of people stating that they have a physical disability is over 4 times the expected cell count. The same pattern is shown in the 50-64 category, but the difference between the observed and expected cell counts is far less pronounced.

These results are slightly distorted by the 0-15 age category, where respondents have not given full ‘yes’ or ‘no’ responses and have just entered in a proxy response instead.

4.52 DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST MODE USED BUS

The null hypothesis was that physical disability being an impairment to mobility had no bearing on the mode of bus being used and the result was not significant. The observed count of people using the bus is similar to the expected count. Buses typically offer a more accessible mode of transport to people with disabilities, being located at street level, and Berlin like London has a 100% low floor bus fleet (see chapters 1.1, 1.2 and 1.3). These hypotheses seem to be confirmed by the crosstabulation, where observed and expected cell counts for people reporting having some kind of physical impairment and people reporting using the bus have very similar values.

There is however a degree of ambiguity in the responses. The difference between people answering ‘yes’ for not using the bus and people answering ‘no’ to using the bus are rather unclear. It is assumed though that all these respondents chose not to use that mode for whatever reason. However in the used category, there is also the option to say ‘no, we used the bus’. It would have been much better to have had more clearly defined responses, i.e. ‘yes used the mode bus’, or ‘no did not use the mode bus’, which would have assisted greatly in the clarification and interpretation of the results. It should

also be pointed out that the fraction of the overall sample used in these crosstabulations is very small (around 10%) due to the high numbers of people marking responses such as ‘don’t know’, or refused to answer, or just left the response field completely blank.

4.53 DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST MODE USED UNDERGROUND OR TRAM

The null hypothesis was that physical disability being an impairment to mobility had no bearing on the modes of underground or tram being used and the result was highly significant. Mobility impaired people appear to have a lower use of the modes of underground and tram. This is almost certainly to do with difficulties in boarding the vehicles, where high floor trams are concerned or reaching the platforms and from there safely boarding and alighting from the trains of the U-Bahn at stations, where there are no step free facilities.

It may seem rather curious that the modes of underground and tram have been grouped together. Low floor trams typically have similar levels of accessibility to buses, but as previously mentioned, there are still numerous high floor trams in daily service in many German cities including Berlin. The grouping of Underground and tram together as modes almost certainly stems from the networks in many German cities, e.g. Cologne and Frankfurt, where the light rail tram systems also have covered sections of track with stops below street level and thus form a kind of U-Bahn in the city centre.

4.54 COMBINED JOURNEY DISTANCE AGAINST DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY

The null hypothesis was that physical disability being an impairment to mobility does not have an effect on the distance travelled and the result was highly significant. The number of respondents reporting an impairment due to their disability steadily decreases as distance increases. This is most likely explained by the fact that people with an impairment are not attempting longer journeys, which tallies both with the previously mentioned lower levels of OAP and disabled pass use (see chapters 4.46 and 4.47 above), as well as the known patterns of lower average daily trip rates (see chapter 3.1).

4.55 DIFFICULTIES AGAINST FREQUENCY OF BUS USE

In the NTS Disability data sets, it would have been extremely helpful if they had been more specific about the various types of disabilities experienced by the respondents and perhaps combined the separate difficulties set out above into fewer categories as per the MiD 2002 data. That way a clearer pattern of use within the different groups of disabled users could have been obtained. I did contemplate whether it would be sensible to combine all these various categories of difficulty together, to be able to crosstabulate mobility difficulties against frequency of bus use. As more than one difficulty may apply to the same respondent, there was a very high risk of introducing double counting into the crosstabulation and so this idea was not pursued further.

Instead I decided to use weighted averages, to ascertain which difficulties had the greatest or least effect on frequencies of bus use. It should be pointed out though that the percentage of the whole sample who reported a difficulty in using bus services was extremely small, only totalling 2.95%.

572 respondents answered ‘yes’, and of those 407 gave definitive answers. The total sample size = 19127; from that I subtracted 5320 people who gave no response, leaving a total of 13807. This also includes the people who answered ‘no’ to each of the questions. The percentage of the remaining sample who reported a difficulty = 407/13807 * 100 = 2.95%.

In each crosstabulation in appendix A, the column total average weighted trips = the sample size of 13807 divided by the total number of weighted trips, i.e. for getting to the bus stop, total number of weighted trips = 1384. Total average weighted trips = 13807/1384 = 10.

The weightings were assigned into the following categories:

Less than once a year or never, once or twice a year, and less than once a month more than twice a year were added together and weighted as 1.

Once or twice a month was weighted as 1.5 (times per month).

Less than once a week more than twice a month was weighted as 3 (times per month).

Once or twice a week was weighted as 6 (times per month).

3 or more times a week was weighted as 12 (times per month).

Categories not applicable and did not answer were assigned a weighting of 0; as were all the negative responses in the same time categories.

DIFFICULTY WITH GETTING TO THE BUS STOP

The people reporting that they have difficulty in reaching their local bus stop were likely to travel less frequently than the sample as a whole. The weighted average was 10 trips a month or around 2.5 trips a week. This seems to suggest that accessing their nearest bus stop does represent a major obstacle to them, as the average weighted trip rate is substantially lower than those reported for other potential difficulties. It may also be that some people are using alternative modes to complete their journeys e.g. Dial-a-Ride or lifts from friends.

DIFFICULTY WITH IDENTIFYING DESTINATION

In this case the total number of weighted trips is far less than for the previous category of difficulty and only totals 236.5. This means that the average weighted trip frequency is higher at 58.3 trips per month, or around 14.5 trips per week, implying that having difficulty reading the destination of the bus is not a major barrier to bus use.

The respondents who did indicate problems are likely to have impaired vision, but who are quite able to board the bus and ask the driver for the information they require. In London it’s now usual just to wait for the audible iBus announcement, which is automatically triggered every time the doors open (see chapter 1.4).

DIFFICULTY WITH STANDING WAITING AT THE BUS STOP

There is a low frequency of bus use amongst the group affected, which has a weighted average of 10.5 trips per month. Many people who are reporting using the bus less than once a year, or never, would presumably be making their journeys via alternative modes. It is worth noting that in the whole population, there is a group of people who use the bus less than once a year or never.

DIFFICULTY WITH GETTING ON OR OFF THE BUS

For the categories 6-12 times a month and also for the combined categories up to once a month, high levels of use are reported. The average weighted trip frequency is 8.5 trips a month. This suggests that getting on or off the vehicle does pose a considerable obstacle to many mobility impaired people, as might be expected. Those who are unable to use the mode bus would then typically either use taxis, Dial-a-ride or lifts from friends and family to complete their journeys.

DIFFICULTY WITH GETTING TO OR FROM THE SEATS

The average weighted trip frequency for this category is 16.6 trips a month, which suggests that the difficulty of getting to a seat is important for disabled travellers, who normally prefer to be seated before the bus pulls away from the stop.

DIFFICULTY IN COMMUNICATING WITH THE DRIVER OR CONDUCTOR

The total number of weighted trips only adds up to 223, which converts into a weighted average trip frequency of 61.9 per month. This would seem to suggest that communication with the driver or conductor does not represent a major obstacle for people with reduced mobility. This is rather surprising, as it could be argued that the need to communicate with on-board staff is particularly important for many groups of mobility impaired travellers, who usually require a certain level of additional assistance during their journeys.

4.6 CYCLING RELATED CROSSTABULATIONS

Crosstabulations 4.61, 4.63 and 4.65 were conducted using the MiD 2002 data set and crosstabulations 4.62 and 4.64 were conducted using the NTS 2002-2008 data set.

4.61 HOUSEHOLD SIZE

AGAINST DO YOU CURRENTLY OWN A ROADWORTHY BICYCLE

The commentary here directly compares the findings from crosstabulations 4.61 (MiD) and 4.62 (NTS), which is entitled “HOUSEHOLD STRUCTURE AGAINST NUMBER OF BICYCLES”. In this commentary, only basic frequencies are discussed.

High levels of cycle ownership amongst Berlin households are displayed here. 73.5% of all households in the sample own a bike. Levels are highest in the two, three and four person categories, which account for 60.9% of the sample as a whole. In London 40.5% of the households sampled own a bike and 30.3% of families also own one. As the NTS lists several different familial structures, all the results from one parent families onwards were added together to obtain this result.

There are also healthy levels of cycle ownership amongst one person households in Berlin, with 63.4% of them reporting owning a bike. This reaffirms Berlin’s position as a popular cycling city in Europe. The mode is regularly used both on its own and in tandem with public transport. Levels of cycle ownership

amongst the one person households in London are substantially lower than in Berlin and only total 20.2% of the households surveyed. 93.2% of single adults aged 65+ and 83.5% of two person households of the same age range are likely not to own a bicycle.

4.63 AGE AGAINST MODE USED BICYCLE

The commentary here directly compares the findings from crosstabulations 4.63 (MiD) and 4.64 (NTS), which is entitled “AGE AGAINST FREQUENCY OF BICYCLE USE”.

The null hypothesis was that age has no bearing on the frequency of bicycle use and was highly significant for crosstabulation 4.63 and weighted averages were used in crosstabulation 4.64.

In the school leavers/young adult age group (16-25) in Berlin, there is a higher than expected number of cycle trips 66 as opposed to 55, a difference of 20%. This is probably mainly attributable to short cycle trips to and from their place of education.

Weighted averages were used when analysing the NTS data for London, to estimate the trip frequency per month. Categories of less than once a month were combined and assigned a weighting of 1.

For the other categories, the following weightings were used:

Once or twice a month = 1.5

Less than once a week more than twice a month = 3

Once or twice a week = 6

3 or more times a week = 12

There is a strong emphasis on child cycle use, probably through children cycling to and from school. The weighted average monthly trip frequency for the youngest two age groups is considerably higher than subsequent categories at 3.8 for the 5-10 year olds, decreasing slightly to 3.7 for 11-15 year olds. The rate then drops sharply to 2.2, almost half the previous value for the subsequent 16-19 age group.

As expected, there is a very low proportion of trips by bike made by the oldest age groups in both cities. In Berlin the age group 65+ only represents 6.8% (36/926) of journeys made by bicycle. Percentage of cycle trips across the whole sample 531/6947 * 100 = 7.6%. Applying this to the 65+ age group, expected count = 7.6/100* 926 = 70.4, so the observed count is much lower at 36.

In the working age group in Berlin, the expected count for people using a bike = 7.6/100 * 2695 = 204.8 and the observed count is much higher than this at 251. This may well be explained by the importance of cycling as both an access/egress mode to and from local public transport stopping points in Berlin and the substitution of shorter journeys which would otherwise be made by public transport.

In London the older age groups display far lower cycle use, although there is a slight rise again in the average weighted monthly trips for the 30-39 year olds to 2.1. This is perhaps attributable to people cycling as part of their journey to and from work. From the 40-49 age group onwards, there is a gradual downward trend to the 70+ age group, who make very few trips by cycle, as might be expected.

The higher level of cycle use by the working age group in Berlin is perhaps the most striking difference between patterns of cycle use in the two cities. Cycling in Berlin still far exceeds that in London by about 4 times (8% as opposed to 2%), but as one might expect is quite seasonal in nature i.e. is most popular during the summer months, or good, dry weather during the winter (see chapters 3.3 and 4.65 below).

The overall situation in London may well change over the next few years with the new Barclays cycle scheme, which allows people to hire bikes on demand and to return them to a dedicated stand at the end of the day. Higher levels of cycle use may then substitute short underground or bus trips with in zone 1, as people use cycling as their preferred access and egress mode to one of the main line London rail termini. London was increasing from a cycling base of about 1% at the time of the MiD 2002 survey. Berlin also has a very popular cycle hire scheme known as “Call a Bike”, which operates in a very similar way to the Barclays cycle scheme in London.

4.65 MAIN MODE AGAINST WEATHER ON THE SURVEY DAY

The null hypothesis was that the weather on the survey day had no bearing on the mode used for the journey and the result was highly significant. There appears to be greater use of bicycle in sunny or light cloud weather conditions and lower use especially when it's raining. The usage drops still further to very low levels during adverse weather conditions such as snow as would be expected.

The recorded use of public transport is lower than expected under sunny conditions. This may be due to the fact that people then decide either to walk or cycle instead. Public transport usage has a higher than expected observed count when it's raining, and this increase appears to be almost directly proportional to the decrease in cycle usage under the same weather conditions.

Journeys on foot exhibit an unexpected pattern, as they show higher than expected counts during heavy cloud and rain, where the opposite would generally be expected. This may be because people still walk to their nearest bus stop or railway station in these weather conditions before continuing their journey on public transport, as opposed to making their whole journey on foot, which they would normally do during better weather.

4.7 SUMMARY OF KEY FINDINGS AND CONCLUSION

The commentaries for Berlin and London have been grouped around five key headings concerned with age, household size, trip frequency and ticket types, disability and levels of cycling. The main reason for this was to draw out and highlight areas where Berlin and London display similar or contrasting trends. The key findings from the crosstabulations discussed throughout this chapter are summarised here.

Levels of car ownership, distribution of cars by household size and age group and the distance to the nearest bus stop or railway station, all confirm a broadly comparable pattern between both cities.

The one person households are far more biased towards zero car ownership than larger household sizes. The number of people in a one person household without a car in Berlin = 59%, which is incredibly similar to the equivalent figure for London of 61%. The figure for three person non-car owning households is also very similar and equals 14% for Berlin and 16% for London. This is considerably lower than the value for one person households, as larger households are far more likely to own a car. One person households are far more likely to have no access to a car, which is supported by the known relatively low car ownership in Berlin per 1000 population and the high use of cycling and public transport as alternative modes. This may well be connected with age too, as older people e.g. pensioners are more likely to live on their own and in smaller households than the younger age groups.

One conclusion which can be derived from this is that as household size increases, the probability of having access to a car also increases. This is most pronounced for household sizes of three and four persons. The reverse scenario appears to be true for five and six person households i.e. the observed count for having no access to a car is considerably less than might be expected. A further causal effect may well be the high density accommodation especially in the east of Berlin and the inner suburbs of London, where there may be a shortage of parking spaces, but good public transport links instead.

84% of Berlin households in the sample live within 14 minutes of their nearest bus stop and 79.8% live within six minutes, which equates to a distance of around 480 metres. It is also highly likely that the level of access to both the bus and rail networks has improved further since 2002 when this data set was collected (see Reinhold 2008). 72.6% of the MiD sample live within 14 minutes of their nearest railway station, which roughly corresponds to one kilometre. It is assumed that both S-Bahn and U-Bahn stations have been counted together. Stations tend to be further away in distance from the low density housing in the outer suburbs of Berlin with the average spacing quoted by BVG as being just under 800 metres. This still represents a good level of rail access, which one would expect for a city such as Berlin.

The NTS in London reports that 88.3% of households live within 6 minutes of their nearest bus stop, which is about 10% higher than the corresponding figure for Berlin. One explanatory factor behind this may be that London has a denser network with more stops and frequent services. Single adults in the age group 65+ are less likely to live within 7 minutes' walk of their nearest stop than the

sample as a whole, which may well be a function of the lower walking speed of more elderly individuals. Single adults 16-64 and single parent families are slightly more likely to be within a short walk of 6 minutes or less, which may well be as a result of living in high density accommodation such as inner city blocks of flats and some individuals having a higher than average walking speed (see ONS 2011).

In the NTS 2002-2008 data set, information about access times to rail stations was not included. Such data is however collected in the NTS, although not published every year. The most recent data available was that from 2007, which showed that 13% of London residents were within 6 minutes' walk of a railway station (Underground or National Rail), and a further 24% within 7-13 minutes' walk, making a combined figure of 37% compared with the Berlin figure of 72.6% within 14 minutes cited above (see table 5.2 in NTS 2007). This is a surprisingly low figure, which may be partially explained by the lower levels of housing in central London as opposed to Berlin.

The topic of disability exhibits differences which are not so clearly defined due to variations in definition between the UK and Germany. Crosstabulations 4.46 and 4.47 from the NTS data set portray the patterns of OAP and concessionary disability pass use. There is substantial reporting of very low levels of use, highlighting the lower numbers of trips made by elderly people in general. It is also worth bearing in mind that OAP and disability concessionary passes are typically issued free of charge, so even people who make very few journeys in a year still find it worth applying for and taking it up.

Concessionary disabled pass travel displays a slightly different pattern of use to that of the OAP pass, with both high levels of low use, as well as high levels of far more regular use being detected. These variations are most likely attributable to the specific physical or sensory impairment of the pass holder, which will dictate the degree of impact that it has on their level of mobility.

There are also strong links between age, physical disability and the transport modes used. There is a strong correlation between age and disability and buses typically offer a more accessible mode of transport to people with disabilities, being located at street level and thus easier to board. Berlin like London has a 100% low floor bus fleet. Mobility impaired people typically have a lower use of the modes of underground and tram and this is almost certainly to do with difficulties in boarding the vehicles, where high floor trams in Berlin are concerned, or reaching the platforms via escalators or lifts and occasional stairs and from there safely boarding and alighting from the trains of the U-Bahn or London Underground.

The number of respondents reporting an impairment due to their disability steadily decreases as distance increases. This could be explained by the fact that people with an impairment are not attempting longer journeys, which also corresponds to the previously mentioned lower levels of OAP and disabled pass use. In the NTS Disability data set, it would have been extremely helpful if they had been more specific about the various types of disabilities experienced by the respondents and perhaps combined some of the different difficulties set out above into fewer categories, as per the MiD 2002 data. That way a clearer

pattern of use within the different groups of disabled users could have been obtained.

Cycling is an area where major differences have been detected between Berlin and London. Cycling has a much higher share in Berlin and there's strong evidence of a substantial amount of cycling from the working age adult population. 73.5% of all households in the sample own a bike and levels are highest in the two, three and four person categories, which account for 60.9% of the sample as a whole. There are also healthy levels of cycle ownership amongst one person households, with 63.4% of them reporting owning a bike. This is in stark contrast to similar figures for London, where only 40.5% of the households sampled own a bike and 30.3% of families also own one. The most marked difference is in the levels of cycle ownership amongst the one person households, which are substantially lower in London than in Berlin and only total 20.2% of the households surveyed.

The higher level of cycle use by the working age group in Berlin is perhaps the most striking difference between patterns of cycle use in the two cities. This may well be explained by the importance of cycling as both an access/egress mode to and from local public transport stopping points and the substitution of shorter journeys which would otherwise be made by public transport. An interesting phenomenon which MiD records, but NTS does not, is the weather on the survey day. This is more easily done, as NTS covers seven consecutive days rather than just one in MiD. There seems to be greater use of bicycles in sunny or light cloud weather conditions and lower use especially when it's raining. The usage drops still further to very low levels during adverse weather

conditions such as snow, as would be expected. The recorded use of public transport is lower than expected under sunny conditions. This may be due to the fact that people then decide either to walk or cycle instead.

Public transport usage has a higher than expected observed count when it's raining, and it's interesting to note that this increase is almost directly proportional to the decrease in cycle usage under the same weather conditions. Journeys on foot show a surprising pattern, as they show higher than expected counts during heavy cloud and rain, where the opposite would generally be expected. This may be because people still walk to their nearest bus stop or railway station in these weather conditions before continuing their journey by public transport, as opposed to making their whole journey on foot or by bike, which they would normally do during better weather.

Chapter 5 will draw together the key findings of this research and forms the conclusion to the study.

CHAPTER 5

CONCLUSION TO THE STUDY

INTRODUCTION

The study has aimed to investigate and analyse thoroughly the comparative accessibility of the public transport networks of Berlin and London focussing mainly on the various needs of disabled travellers. A variety of general accessibility measures in wider literature were examined before considering some more specific accessibility indicators and their practical application, e.g. the TfL indicator PTAL and its successor ATOS. These indicators were then contrasted as far as possible with equivalent ones in Berlin. Some of them were also analysed further statistically in SPSS using the MiD 2002 and NTS 2002-2008 data sets. Commentaries on the key results from these crosstabulations are contained in chapter 4 and the associated numerical data in appendix A.

A further intention of the work has been to assess the explanatory factors behind the levels of accessibility and to compare the trends in both cities, with the view of establishing areas of good practice, which ultimately may be transferable between Berlin and London. Some closely related, topical issues e.g. the market share of public transport, the passenger trip rates per head of population in each city and how these vary according to levels of physical disability and the role of cycling were discussed in chapter 3. This concluding chapter aims to bring all of these constituent themes together, whilst also reviewing the potential strengths and weaknesses of the study and discussing the scope for further future research in this particular field.

5.1 KEY HISTORICAL DEVELOPMENTS

Railways arrived in Berlin and London during the period of the industrial revolution in the late 1830s and early 1840s. A series of terminal stations were constructed around the perimeter of each city by separate railway companies, who were all keen to preserve their own individual identity. None of them succeeded in penetrating into the heart of either Berlin or London however, due primarily to the high cost of the real estate. A means of connecting the termini together needed to be found and came to fruition in the shape of underground railways in London and the Ringbahn in Berlin.

The London Underground was world leading and preceded Berlin's by just under forty years. Both cities also boasted a network of heavily used, suburban lines, some of which were elevated on viaducts and which quickly played a vital role in transporting large volumes of passengers. Mass electrification programmes of the suburban lines took place in Berlin and London in the decades between the two World Wars, and in London these schemes continued on into the 1950s.

Electrification brought with it numerous benefits, which included faster overall journey times, a major reduction in the soot and smoke in the atmosphere from the intensive steam hauled services and a sharp growth in passenger numbers. It also led to the birth of the Berlin S-Bahn in 1930, whilst the railways in London were particularly keen to compete with the electric tramways which were

springing up in many suburbs and attracting passengers away from the heavy rail lines.

It is interesting to note that London had the first underground railway in the world, which opened in 1863, whilst Berlin lays claim to having had the first electric tramway in the world, which opened in 1881. The undoubted success and expansion of all the networks discussed in the study was due primarily to the invention and further development of the electric motor in Berlin by Werner von Siemens in 1879. Berlin and London had umbrella organisations responsible for their public transport, which were founded within a few years of each other. BVG was formed in 1929 and the LPTB in 1933, which latterly became LT in 1948. The Berlin S-Bahn and mainline suburban railways within London however, remained firmly outside of these organisations (see chapters 1.1 and 1.2).

5.2 COMPARATIVE ACCESSIBILITY OF THE PUBLIC TRANSPORT NETWORKS

During the construction of the public transport networks of Berlin and London (see chapters 1.1, 1.2, 1.3 and 5.1 above), there were no such things as disability discrimination legislation or various accessibility indicators, which needed to be monitored and adhered to. The consequences of this are often felt today, when trying to adapt the networks to meet the high expectations and physical needs of mobility impaired passengers.

Accessibility is defined throughout the study as the physical access passengers have to their local public transport services e.g. walking time to their nearest railway station/bus stop, and once there how easy is it for them to reach their destination i.e. frequency of service, destinations served, direct services as opposed to the need to change en route. Other aspects included in the definition are the ease of boarding and alighting from vehicles independently, and the level of accessible on-board information such as audible announcements and clear and coherent customer information systems (CIS), as well as staffing levels and the amount of disability awareness training they receive (see chapters 1.3, 2.1 and 2.2).

All of these issues have a direct impact on the ease with which passengers with reduced mobility can use public transport safely and independently. One of the most striking contrasts between Berlin and London is the amount of front line staff present on the network. Berlin has an open, largely automated system with very few staff at stations. Help can be summoned remotely via communication

points on the platforms. Operational staff on the vehicles themselves receive minimal disability awareness training, which only seems to be provided during their initial training and is then not further refreshed at regular intervals as in London (see chapter 2.2).

Staffing levels on the London Underground remain high, in spite of recent rounds of job losses and a further round of cuts is scheduled to take place after the Olympics in late 2012. Most underground stations in London are staffed during operational hours. London buses, London Tramlink and DLR on the other hand are open networks and operate on a similar basis to Berlin. A major difference is that all of the operational staff in TfL receive thorough disability awareness training, which is then regularly refreshed on an annual basis (see chapter 2.2).

Another major difference is the fact that Berlin only has one person per transport operator, who is responsible for access and inclusion to the system for mobility impaired passengers. This is in stark contrast to TfL, who have both access and inclusion and equality and inclusion units, which are solely dedicated to this aim (see chapter 2.1 and appendices B, C and D of this work).

Good levels of on-board audible information are provided in both Berlin and London, and tactile strips along the platform edges at many stations on the systems are a basic, but extremely effective safety feature. The amount, clarity and frequency of information given by the on-board and on platform announcements do vary quite considerably between Berlin and London. A far

greater degree of standardisation in this would be highly beneficial, for those who are wholly reliant on it for their own independent mobility.

London appears to be making great strides to catch up with many other cities in Europe, in the provision of good quality audible information and step free access to its networks (see chapters 2.6 and 2.7). The deep level tube lines present some quite difficult challenges to achieve these aims and it is unlikely that the London Underground will ever become 100% step free. This aspiration is still held by BVG, although it's likely to be several years before the remainder (47%) of the U-Bahn network is so converted.

Accessibility is one aspect which may help to explain some aggregate trends and differences in public transport ridership in Berlin and London. There is a continual need for further programmes to enhance and expand accessibility throughout the networks. Before these can be implemented, it is necessary to consider the potential sources of funding available to carry out the work, and how much time is involved in putting a package of improvement measures into place. There is also a need for a more coherent and satisfactory method of evaluating the effectiveness of the programme of improvements, once they have been completed.

Public transport in both cities also fulfils the role of a social service by enabling people who do not have access to a car, or who are disabled, elderly or on a low income to access essential facilities such as shops, jobs, medical and health services relatively easily. This is a particularly acute need in many of the eastern boroughs of Berlin and London, where there are higher than average

levels of low income, unemployment and social exclusion. This is all the more important when the fact that only around half the households in Berlin own a car is taken into consideration. They are therefore very reliant on the provision of good public transport services to cater for their individual mobility needs. It enables them to work, socialise and play a full and active role in society (see Vuchic 1999, Lucas 2001, Bagge 2008, and Lucas 2012).

Free concessionary travel passes are usually provided to all disabled people in Berlin and London and also to the over 60s in London. This is one main difference between the two cities. The concessionary fares scheme in greater London is considerably more generous than the equivalent one in Berlin. In London all travel on TfL services is free at any time of day, seven days a week without any other restrictions and on national rail services within zones 1-6 after 09.30 in the week and all day at weekends.

In Berlin, most registered disabled people are entitled to a concessionary pass (Schwerbehinderter Ausweis) which entitles them to free travel on all modes of transport contained within the VBB network. This includes all BVG's services and those of the S-Bahn and regional railways within Berlin zones A, B and C. There is no statutory, concessionary pass for people aged over 65 in Berlin as in London, but there is a wide range of discounted fares available, e.g. monthly/quarterly/annual season tickets. The price of these can be further reduced if you opt to pay in one annual instalment by direct debit, as opposed to monthly instalments or in cash. These typically offer a minimum saving of 50% of the standard fare, but the saving can be as much as 67%, if the annual payment option described above is used.

5.3 MODAL SHARE AND THE ROLE OF CYCLING

The modal share of cycling in Berlin is much greater than in London, with approximately 8% of all journeys being made by bike, as opposed to only around 2% in London (see Pucher and Buehler 2008).

The modal share of cycling in Berlin, for the journey to and from work is quoted as 13% (see Amt für Statistik Berlin Brandenburg 2009). This may well be due to the far better provisions made for bicycles in Berlin, which include safe, storage facilities at many S-Bahn and U-Bahn stations, together with specially designated areas on many trains. Bikes are also permitted on all BVG buses and the U-Bahn network at any time provided that other passengers are not severely inconvenienced.

The far higher use of the bicycle in Berlin may also account for a lower trip rate of public transport per head of population. It not only acts as a potential feeder/distributor mode into the other public transport networks, but it becomes a viable alternative for a shorter distance journey, which would otherwise be made by public transport (see Pucher and Buehler 2008). Berlin and London both have successful cycle hire systems known as “Call a bike” in Berlin and the “Barclays cycle scheme” in London (see chapter 3.3).

5.4 CONCLUDING OBSERVATIONS

In conclusion to this study, it is necessary to consider its key outcomes, relative strengths and weaknesses and to comment on the scope for possible future research.

One question central to the study remains as yet unanswered. It would seem very worthwhile to attempt to establish whether Berlin or London may be described as having a greater degree of accessibility than the other. There are certainly areas of good practice displayed in each of them, but juxtaposed with this, are certain areas where vast improvements could be made.

In Berlin the far higher levels of automation with regard to ticket purchasing, seeking information when planning journeys and the minimal staff presence, could be deemed as having a negative effect on the overall ease of using the network by disabled passengers. An example where automation does make a positive contribution to accessibility however is the announcements on the vehicles, which do help various groups of disabled travellers including tourists orientate themselves in the city. These systems also appear to be pretty reliable on the whole, although temporary breakdowns and failures can never be excluded completely.

In my own experience, it is still fairly common in London to find individual trains or buses, where these systems are either totally defective or have not even been activated, or instead have been switched off entirely by the driver. This results at best in the minimum amount of audible information being provided, or

at worst no audible information at all being heard in the vehicle. All of the information is usually still displayed optically on the Customer Information System. This ultimately has a major impact on passengers with a visual impairment, who may well be wholly reliant on spoken information, to be able to alight at their chosen stop or station independently (see chapter 2.6).

A key finding of the research is that native Germans enjoy a greater degree of access to the Berlin networks and those of other German cities than people from other countries visiting Berlin, due to the provision of a nationwide concessionary pass, which alleviates the need to purchase and validate tickets prior to travelling. Although tickets can be bought from staffed ticket offices at larger stations, their validation prior to travel is virtually impossible to carry out independently, if you are severely visually impaired. The only way round this problem is to buy tickets from any BVG bus, as they are already validated when issued from the driver's machine. This flaw in the ease of use of the ticketing system in Berlin was duly pointed out to the key representatives of the transport operators. A potential resolution to the problem will almost certainly be extremely slow at being implemented, as it does not affect native Germans, who doubtless constitute the majority of daily travellers on the network. It was also pointed out that if change were to happen, it would have to be a joint policy decision across the whole VBB network, as all the various transport operators would need to implement similar changes at more or less the same time (see chapter 1.6 and appendices B and C).

When contemplating physical access to the networks, it could be argued that Berlin is far more accessible than London, due to its higher proportion of step

free stations and platforms with level access on and off the vehicles. This is however not necessarily a fair comparison, as it conveniently ignores the relative size of the Berlin and London networks and such historical legacies as the depth of some London Underground stations below ground level. It does appear from my research though that a great deal is being done by BVG, the Berlin S-Bahn and TfL on an annual basis, to improve the accessibility of their respective networks as far as possible .

All London Underground stations will have been fitted with the tactile blind guidance strips along the platform edge by the end of 2013 and BVG and the Berlin S-Bahn networks will continue to install their version of the tactile strips at their stations and will hopefully have completed this work at 100 % of them before the end of the decade.

A considerable enhancement to the study would have been to plan and make journeys with and interview more people in Berlin with various physical and sensory impairments, to obtain a broader and deeper understanding of the various challenges they need to overcome when they are using public transport. It would have been extremely useful to have conducted similar levels of qualitative research and interviews in London, in order to have had a direct comparison on the relative usability of each network and which city is most successful at meeting the needs of its disabled travellers. It would also have been very interesting to have gauged more opinion on the exact degree of usability of the text network maps and the various online journey planners available and to ascertain how they might be refined in the future, to assist

visually impaired people in navigating around the public transport systems with maximum ease and independence.

The many differences in definitions of the MiD 2002 and NTS 2002-2008 data sets presented multiple challenges to overcome. In addition, there was the issue of wherever possible comparing the results from the MiD 2002 data set with equivalent figures from the more recent MiD 2008 data set. As so little change had taken place in the interim, the results from MiD 2002 were still deemed to be valid. There was also the issue of having to locate and draw together many of the key, headline statistics used in the study from a wide variety of different sources. The statistical analysis of the crosstabulations was particularly challenging for me, but it is hoped that in spite of these many difficulties, they lend weight to and underpin the main hypotheses and themes of the thesis.

Despite their vastly different historical backgrounds and differences in methods of funding and operations, Berlin and London would seem to have achieved highly complex and efficient transport networks, which serve the cities well. The division of Berlin for almost 30 years inevitably had a profound impact on its public transport network, but it stood the test of time in that unique political environment and today functions as an integrated whole once again. London is home to the first underground railway in the world and this historical legacy brings with it many challenges when trying to make the system accessible to mobility impaired passengers, but it would seem that every effort is now being made to redress this balance. The public transport network coped with the

unprecedented transport demands during the 2012 Olympic and Paralympic Games incredibly well and without incident.

The possibility of either Berlin or London having networks which are fully accessible to everyone is more of a utopian dream rather than a viable reality, but both cities nevertheless appear to be striving hard to try and achieve this really worthwhile goal. The sheer complexity of this challenge has been highlighted during the study and the overriding message seems to be that one size certainly does not fit all, as far as improving access to public transport is concerned. The diverse range of needs and expectations usually require a multitude of different approaches and solutions to be implemented and an ideal outcome is not always possible for many reasons. In spite of these tough challenges and difficult decisions however, which undoubtedly still lie ahead for all the transport operators mentioned in this work, Berlin and London can certainly be viewed as cities which are well and truly on the move.

BIBLIOGRAPHY

Adeney, W. *'A Comparison of Underground Railway Companies in London and Berlin'*, Dissertation for Intercollegiate MSc in Transport, University of London Centre for Transport Studies IMPERIAL COLLEGE, September 1997 (unpublished).

Ahlfeldt, G. *'A New Central Station for a Unified City. Predicting Impact on Property Prices for Urban Railway Network Extensions in Berlin'*, University of Hamburg (working paper), September 2008.

Alexandersson, G. and Hulten, S. *'Competitive tenders in passenger rail services. Looking in to the theory and practice of different approaches in Europe'*, European Transport (Special Issue), August 2006, pp. 6-28.

Amt für Statistik Berlin Brandenburg. '*Mikrozensus 2009',* available online at http://www.statistik-berlin-brandenburg.de, last accessed Friday 22/04/2011).

Bagge, K. *'Disadvantaged districts as the focal point of transport policy - the Berlin example'*, Public Transport International no. 6, 2008, pp. 11-13.

Balcombe, R. et al. *'The demand for public transport: a practical guide'*, TRL Limited, 2004.

Ball, J. *'Vertical separation and the restructuring of EU Metros'*, Dissertation for MSc Transport Planning and Management, University of Westminster, 2001 (unpublished).

Barker, T. C. and Robbins, M. (1974) *A history of London transport Volume I (the nineteenth century) and Volume II, (the twentieth century to 1970)*, London: George Allen and Unwin.

Braun, M. (2008), *Nordsüd-S-Bahn Berlin. 75 Jahre Eisenbahn im Untergrund*, Berlin: Berliner S-Bahn-Museum GVE Verlag.

BVG. *'Der Berliner Omnibus'*, Berliner Verkehrsbetriebe, (Copy received April 2008).

BVG. *'Die Berliner Straßenbahn'*, Berliner Verkehrsbetriebe, (Copy received April 2008).

BVG. *'Die Berliner U-Bahn'*, Berliner Verkehrsbetriebe, (Copy received April 2008).

BVG. *'Mobility for the Metropolis'*, Berlinerverkehrsbetriebe, May 2006.

BVG. *'Zahlen Spiegel 2007'*, Berliner Verkehrsbetriebe, 2007.

BVG. *'Anlatge 1, Teil 3, Zugansstandards'*, Berliner Verkehrsbetriebe, 2007.

Collins, M. F. and Pharoah, T. (1974), *Transport organisation in a great city : the case of London*, London : Allen and Unwin.

Darrall, J. *'From PTAL to PTIAL: Assessing public transport accessibility'*, Dissertation for MSc Transport Planning and Management, University of Westminster, 2007 (unpublished).

Department for Transport. *'Public Transport Statistics Bulletin GB: 2008 edition'*, DfT 2008, available online at http://www.dft.gov.uk/transtat (last accessed 30/10/2009).

Department for Transport. *'National Travel Survey 2007, Interview Data'*, DfT Statistics Bulletin SB(08)22, 2008.

Department of Transport Directorate of Statistics. *'Busdata'*, Department of Transport, January 1994.

Disability Rights Commission. *'DRC Response to the Cabinet Office Consultation on Transport and Social Exclusion'*, 2000 available at http://www.drc-gb.org/InformationAndLegislation

Dubenkropp, H. *'Development of the Berlin municipal transport system'*, European Transport, November 2004, pp. 12-17.

Eyers, T., Jones, P. et al. *'The Jubilee Line Extension Impact Study: main findings and lessons for future appraisal of major public transport investments'*, European Transport Conference, Strasbourg, October 2004.

Fabian, T. *'The evolution of the Berlin urban railways network'*, Japan Railway and Transport Review, October 2000, pp. 18-24.

Fox, B. *'New European TTs from December 06 including ICE expansion'*, Modern Railways, November 2006, p.40.

Garbutt, P. (1997), *World Metro Systems*, (2nd edn), Harrow Weald: Capital Transport Publishing.

Geurs, B. van Wee. *'Accessibility evaluation of land-use and transport strategies: review and research directions'*, Journal of Transport Geography 12 2004, pp. 127-140.

Givoni, N. and Rietveld, P. *'The access journey time to the railway station and its role in passengers' satisfaction'*, Transport Policy Volume 14, 2007, pp. 357-365.

Gough, J. *'Berlin's new railways: A general description of revised long distance and regional networks'*, Modern Railways, June 2006, pp. 64-70.

Gorter, M. *'DIRECT AWARDS IN GERMANY - DESIGN AND EFFECTS'*, Thredbo 11, Delft University of Technology (The Netherlands), September 2009.

Greenfield, T. (ed) (2002), *Research Methods for Postgraduates* (2nd edition), London: Arnold.

Gympel, J. (2002), *U-Bahn Berlin*, Berlin: Berliner S-Bahn-Museum GVE Verlag.

Hall, P. and Hass-Klau, C. (1985), *Can rail save the city? The impacts of rail rapid transit and pedestrianisation on British and German cities*, Hampshire and Brookfield Vermont: Gower.

Handy, S. and Niemeier, D. *'Measuring accessibility: an exploration of issues and alternatives'*, Environment and Planning A Volume 29, 1997, pp. 1175-1194.

Hardy, B. (1996), *The Berlin S-Bahn*, Harrow Weald: Capital Transport Publishing.

Hardy, B. (1996), *The Berlin U-Bahn*, Harrow Weald: Capital Transport Publishing.

Lawrence, D. (2000), *A logo for London*, Harrow Weald: Capital Transport Publishing.

Heinemann, T. and Pohl, F. *'German Profile: S-Bahn Berlin Yesterday, today and tomorrow'*, Eurotransport no. 1, February 2008, pp. 14-19.

Heins, I. and Wazlak, K. *'The cycling boom in Berlin: a challenge for public transport'*, Public Transport International no. 4, July/August 2010, pp. 44-46.

Horncastle, J. *'Too much information?'*, 2009 available online at http://www.disabledpersons-railcard.co.uk/news.

Kuhnimhof, T., Chlond, B. and Po-Chi, H. *'The Multimodal Travel Choices of Bicyclists – A Multiday Data Analysis of Bicycle Use'*, World Conference on Transport Research (WCTR), Lisbon, July 2010.

Link, H. *'Public Transportation in Provincial Areas. Regional Rail Companies in Germany'*, Japan Railway and Transport Review no. 52, March 2009, pp. 38-45.

London Area Travel Survey. *'National Rail results, An introductory report'*, Strategic Rail Authority Statistics Team, February 2005.

Lucas, K., Grosvenor, T. and Simpson, R. *'Transport, the Environment and Social Exclusion'*, Joseph Rowntree Foundation, York, 2001.

Lucas, K. *'Unequal Mobility And Its Social Consequences'*, Socio-spatial Inequalities, Transport and Mobilities Seminar series, Transport Studies Unit, University of Oxford, 2012 (unpublished).

Martin, C. *'A study comparing per capita trip rates between surface rail and the Underground'*, Dissertation for MSc Transport Planning and Management, University of Westminster, 2008 (unpublished).

Mees, P. (2000), *A very public solution: Transport in the dispersed city*, Melbourne: Melbourne University Press.

Modern Railways. *'Berlin S-Bahn passengers up by 30% since 1995 to 318 million. Fleet modern etc.'*, September 2005, p.62.

Modern Railways. *'Regenerative braking on DC electrification'*, May 2008, p.70.

Office for National Statistics. *'Social Trends'*, no. 41, April 2011.

Ory, I. *'Berlin: what's my line? Focus on Germany'*, Rail and Transport International, September 2004, pp. 30-38.

Patterson, T. *'German efficiency goes off the rails'*, *The Independent, August 2009, p.27.*

Pharoah, T. and Apel, D. (1995), *Transport Concepts in European Cities*, Aldershot: Avebury.

PTaccess Report. *'Public Transport Systems' Accessibility for People with Disabilities in Europe'*, June 2009, available online at http://www.ptaccess.eu.

Pucher, J. and Buehler, R. *'Making Cycling Irresistible: Lessons from the Netherlands, Denmark and Germany'*, Transport Reviews Volume 28, No. 4, July 2008, pp. 495-528.

Pucher, J. and Buehler, R. *'Making public transport financially sustainable'*, Transport Policy Volume 18, January 2011, pp. 126-138.

Radermacher, B. and Fischer, E. *'eTicket Germany - An Interoperable Electronic Fare Management Standard for Public Transport'*, Japan Railway and Transport Review no. 50, September 2008, pp. 56-62.

Reinhold, T. *'More Passengers and Reduced Costs - The Optimization of the Berlin Public Transport Network'*, Journal of Public Transportation Volume 11, No. 3, 2008,
pp. 57-76.

Resch, R. *'Restructuring Berlin's public transport, A story of innovation'*, Public Transport International no. 6, 2005, pp. 20-23.

Riechers, D. (2000), *S-Bahn-Triebzüge: Neue Fahrzeuge für Deutschlands Stadtschnellverkehr*, Stuttgart: Transpress Verlag.

Rudolf, N. *'London-Berlin, A comparison of the evolution of the bus sector'*, Dissertation for MSc Transport Planning and Management, University of Westminster, 2004 (unpublished).

Schade, W. *'Berlin case study. Ambitious policy goals without ambitious policy implementation'*, University of Karlsruhe (working paper), 2003.

Schiefelbusch, M. *'Citizens' involvement and the representation of passenger interests in public transport: Dimensions of a long-neglected area of transport planning and policy with case studies from Germany'*, Transport Reviews Volume 25, No. 3, May 2005, pp. 261-282.

Schiefelbusch, M. and Dienel, H. (eds) (2009), *Public Transport and its Users. The Passenger's Perspective in Planning and Customer Care*, Ashgate: Farnham Surrey.

Streeter, T. *'Berlin's S-Bahn In Chaos'*, Tramways & urban Transit, September 2009, pp. 344-345.

Streeter, T. *'Berlin: Time for division?'*, Tramways & urban Transit, May 2010, pp. 184-185.

Strowitzki, B. (2002), *S-Bahn Berlin*, Berlin: Berliner S-Bahn-Museum GVE Verlag.

Tramways & Urban Transit. *'S-Bahn fined over falling punctuality'*, May 2009, p.190.

Tramways & Urban Transit. *'Berlin S-Bahn Recovery Plan'*, June 2009, p.231.

Transport for London. *'Towards an Accessible Tube'*, 2007.

Transport for London. *'London Travel Report 2007'*, 2008.

Transport for London. *'Travel In London'*, Report 3, 2011.

Transport for London. *'Accessibility and Inclusion Autumn 2011 update'*, September 2011.

Transport for London. *'Accessibility and Inclusion Winter 2011 update'*, December 2011.

Transport for London. *'Accessibility and Inclusion Spring 2012 update'*, March 2012.

Transport Studies Group (TSG). *'Measuring Accessibility as Experienced by Different Socially Disadvantaged Groups: Social Accessibility Mapping Project'*, University of Westminster, 2005 (unpublished), available online at http://home.wmin.ac.uk/transport/projects/samp.htm.

UITP. *'Organisation and major players in short distance public transport. New developments in European Union'*, UITP revised edition, February 2006, pp. 23-26.

UITP. *'Mobility in cities database 2006'*, February 2007.

Vuchic, V. (1999), *Transportation for livable Cities*, Centre for Urban Policy Research, Rutgers: USA.

Walker, P. *'Berlin tramway investment since the east-west wall toppled'*, Light Rail and Modern Tramway, March 1997, pp. 89-92.

Walker, P. *'Berlin the trams help bond the city in to one community again'*, Light Rail and Modern Tramway, April 1997, pp. 131-134.

Walton, S. *'The Comparative Effectiveness of the Performance Regimes in Surface and Underground Rail'*, Dissertation for MSc Transport Planning and Management, University of Westminster, 2007 (unpublished).

White, P. *'Competition in Public Transport in Great Britain'*, European Transport, August 2006, pp. 69-82.

White, P. *'Factors behind recent patronage trends in Britain and their implications for future policy'*, International Journal of Transport Economics Volume XXXVI, no 1, February 2009, pp. 13-31.

White, P., Bagchi, M. and Bataille, H. *'The role of smartcard data in public transport'*, World Conference on Transport Research (WCTR), Lisbon, July 2010.

White, P. (2008), *Public Transport its planning, management and operation*, (5th edition) London: Routledge/Taylor & Francis.

White, P. *'Experience of privatisation and deregulation of the bus and coach industry' in Britain'*, Chapter 5 in Venezia, E. (ed) (2005), *Urban Transport*, Milan: FrancoAngeli.

White, P. *'Transport for London: success despite Westminster?'*, Chapter 9 in Docherty, I. and Shaw, J. (eds) (2008), *Traffic Jam: Ten years of 'sustainable' transport in the UK*, London: Policy Press.

Whitelegg, J. (1993), *Transport for a sustainable future: the case for Europe*, London: John Wiley.

Whitelegg, J. (1998), *Critical Mass: transport, environment and society in the 21st century*, London: Pluto Press.

Wolf, W. (1994), *Berlin Weltstadt ohne Auto? Eine Verkehrsgeschichte 1848-2015*, Berlin: isp Verlag.

Wolmar, C. (2002), *Down the Tube: The Battle for London's Underground*, UK: Aurum Press Ltd.

Wolmar, C. (2005), *The Subterranean Railway*, London: Atlantic Books.

Wolmar, C. (2007), *Fire and Steam - A New History of the Railways in Britain*, London: Atlantic Books.

APPENDIX A
NUMERICAL DATA FROM THE COMPARATIVE CROSSTABULATIONS

N.B. In each of the tables, the number preceding the oblique stroke is the observed count and that proceeding it is the expected count. In cases where a simple table of frequencies was compiled and no statistical test was run, no number appears in front of the oblique stroke.

The three letters in brackets after the title of the crosstabulation denote which data set was used in the calculation.

(MiD) = Mobilität in Deutschland 2002.
(NTS) = National Travel Survey aggregated between 2002-2008.

CROSSTABULATION 4.21 (MiD)
AGE AGAINST NUMBER OF TRIPS PER DAY
(INCLUDING LONGER TRIPS WITH IN THE PAST THREE MONTHS)

AGE RANGE (IN YEARS)	1-4 TRIPS	5-8 TRIPS	9 OR MORE TRIPS	TOTAL
0-15	589 / 486.5	272 / 350.9	0 / 23.7	861
16-24	440 / 406.2	271 / 293	8 / 19.8	719
25-49	1377 / 1522.7	1206 / 1098.3	112 / 74.1	2695
50-64	957 / 986.5	742 / 711.5	47 / 48	1746
65+	562 / 523.2	340 / 377.4	24 / 25.5	926
TOTALS	3925	2831	191	6947

Pearson chi Squared = 127.2, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.22 (MiD)
AGE AGAINST MODE USED ON FOOT

AGE IN YEARS	DID NOT USE	USED	NO RESPONSE	TOTAL
0-15	456 / 490.7	404 / 368.8	1 / 0.5	861
16-24	399 / 409.7	319 / 308	1 / 1.2	719
25-49	1735 / 1535.8	957 / 1154.5	3 / 4.7	2695
50-64	911 / 995	829 / 748	6 / 3	1746
65+	458 / 527.7	467 / 396.7	1 / 1.6	926
TOTALS	3959	2976	12	6947

Pearson chi Squared = 107.6, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.23 (MiD)
AGE AGAINST BUS USE ON THE SURVEY DAY

AGE IN YEARS	DID NOT USE	USED	NO RESPONSE	TOTAL
0-15	749 / 771.4	111 / 88.1	1 / 1.5	861
16-24	591 / 644.2	127 / 73.6	1 / 1.2	719
25-49	2510 / 2414.5	182 / 275.8	3 / 4.7	2695
50-64	1588 / 1564.3	152 / 178.7	6 / 3	1746
65+	786 / 829.6	139 / 94.8	1 / 1.6	926
TOTALS	6224	711	12	6947

Pearson chi Squared = 116.7, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.24 (MiD)
AGE AGAINST UNDERGROUND AND TRAM USE ON THE SURVEY DAY

AGE IN YEARS	DID NOT USE	USED	NO RESPONSE	TOTAL
0-15	771 / 755	89 / 104.5	1 / 1.5	861
16-24	561 / 630.5	157 / 87.2	1 / 1.2	719
25-49	2414 / 2363.3	278 / 327	3 / 4.7	2695
50-64	1515 / 1531.1	225 / 211.9	6 / 3	1746
65+	831 / 812	94 / 112.4	1 / 1.6	926
TOTALS	6092	843	12	6947

Pearson chi Squared = 82.896, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.25 (MiD)
AGE AGAINST S-BAHN AND COMMUTER TRAIN USE ON THE SURVEY DAY

AGE IN YEARS	DID NOT USE	USED	NO RESPONSE	TOTAL
0-15	835 / 806	25 / 53.5	1 / 1.5	861
16-24	627 / 673	91 / 44.7	1 / 1.2	719
25-49	2529 / 2522.8	163 / 167.6	3 / 4.7	2695
50-64	1642 / 1634.4	98 / 108.6	6 / 3	1746
65+	870 / 866.8	55 / 57.6	1 / 1.6	926
TOTALS	6503	432	12	6947

Pearson chi Squared = 7263.9, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.31 (MiD)
HOUSEHOLD SIZE AGAINST AGE

In this CROSSTABULATION only basic frequencies are given.

NUMBER OF PERSONS	0 - 15 YEARS	16 - 64 YEARS	25 - 49 YEARS	50 - 64 YEARS	65+ YEARS	TOTAL
1	0	50	370	227	157	804
2	53	116	727	1165	719	2780
3	215	226	764	234	43	1482
4	428	243	660	96	6	1433
5	118	65	139	17	1	340
6 OR MORE	47	19	35	7	0	108
TOTALS	861	719	2695	1746	926	6947

CROSSTABULATION 4.32 (MiD)
HOUSEHOLD SIZE AGAINST NUMBER OF CARS

In this CROSSTABULATION only basic frequencies are given.

NUMBER OF PERSONS	0 CARS	1 CAR	2 OR MORE CARS	TOTAL
1	400	272	7	679
2	288	826	207	1321
3	59	230	143	432
4 OR MORE	46	271	155	472
TOTALS	793	1599	512	2904

CROSSTABULATION 4.33 (MiD)
HOUSEHOLD SIZE AGAINST AVAILABILITY OF A CAR ON THE SURVEY DAY

NUMBER OF PERSONS	YES ALL THE TIME	YES SOME OF THE TIME	NO NOT AT ALL	TOTAL
1	353 / 453.3	82 / 77.2	368 / 195.7	803
2	1955 / 1717.9	239 / 292.5	796 / 741.7	2935
3	967 / 941.6	209 / 160.3	320 / 406.5	1496
4	812 / 886.3	141 / 150.9	258 / 382.7	1211
5	163 / 219.3	51 / 37.3	78 / 94.7	292
6 OR MORE	44 / 75.6	9 / 12.9	34 / 32.6	87

Pearson chi squared = 1236.718, Degrees of Freedom 45, P = 0.000.

CROSSTABULATION 4.34 (NTS)
HOUSEHOLD STRUCTURE AGAINST CAR OR LIGHT VAN AVAILABILITY

HOUSEHOLD STRUCTURE	CAR OR LIGHT VAN AVAILABLE	CAR OR LIGHT VAN NOT AVAILABLE	TOTAL
SINGLE ADULTS 65+	226 / 545.2	660 / 340.8	886
SINGLE ADULTS 16 - 64	610 / 856	781 / 535	1391
2 ADULTS HOH/HRP 65+	447 / 390.1	187 / 243.9	634
2 ADULTS HOH/HRP 16 - 64	1069 / 949.5	474 / 593.5	1543
3 OR MORE ADULTS	673 / 553.8	2273 / 346.2	900
SINGLE PARENT FAMILY	180 / 287.4	287 / 179.6	467
2 ADULTS 1 CHILD	379 / 307.1	120 / 191.9	499
2 ADULTS 2 CHILDREN	533 / 382.1	88 / 238.9	621
2 ADULTS 3+ CHILDREN	228 / 162.5	36 / 101.5	264
3+ ADULTS 1+ CHILDREN	384 / 295.4	96 / 184.6	480
TOTALS	4729	2956	7685

Pearson chi Squared = 1238, Degrees of Freedom 9, P = 0.000.

CROSSTABULATION 4.35 (MiD)
HOUSEHOLD SIZE AGAINST DISTANCE TO THE NEAREST BUS STOP AND RAILWAY STATION IN MINUTES

In this CROSSTABULATION, cumulative percentages have been given rather than observed and expected counts.

HOUSEHOLD SIZE (PERSONS)	DISTANCE TO (MINUTES)	NEAREST BUS STOP (%)	RAIL STATION (%)
1	1 - 6	80.5	52.9
1	7 - 14	17.6	27.9
1	15 OR MORE	1.9	19.2
2	1 - 6	79	36
2	7 - 14	17.7	34.5
2	15 OR MORE	3.2	29.4
3	1 - 6	78.5	46
3	7 - 14	17.7	31
3	15 OR MORE	3.9	23
4	1 - 6	82.4	30.2
4	7 - 14	13.6	36.5
4	15 OR MORE	4	33.3
5	1 - 6	82	38.8
5	7 - 14	18	22.9
5	15 OR MORE	0	38.3
6 OR MORE	1 - 6	80.3	44.2
6 OR MORE	7 - 14	16.4	32.7
6 OR MORE	15 OR MORE	3.3	23.1

CROSSTABULATION 4.36 (NTS)
HOUSEHOLD STRUCTURE AGAINST WALK TIME TO BUS STOP

HOUSEHOLD STRUCTURE	6 MINUTES OR LESS	7 - 13 MINUTES	14 MINUTES OR MORE	TOTAL
SINGLE ADULTS 65+	720 / 785.3	144 / 91.4	25 / 12.3	889
SINGLE ADULTS 16 - 64	1267 / 1241.2	127 / 144.4	11 / 19.4	1405
2 ADULTS HOH/HRP 65+	511 / 561.8	103 / 65.4	22 / 8.8	636
2 ADULTS HOH/HRP 16 - 64	1422 / 1375.5	129 / 160	6 / 21.5	1557
3 OR MORE ADULTS	810 / 799.5	79 / 93	16 / 12.5	905
SINGLE PARENT FAMILY	426 / 417	41 / 48.5	5 / 6.5	472
2 ADULTS 1 CHILD	459 / 444.4	36 / 51.7	8 / 7	503
2 ADULTS 2 CHILDREN	559 / 549.5	58 / 63.9	5 / 8.6	622
2 ADULTS 3+ CHILDREN	234 / 234.1	29 / 27.2	2 / 3.7	265
3+ ADULTS 1+ CHILDREN	426 / 425.8	49 / 49.5	7 / 6.7	482
				7736

Pearson chi Squared = 133.5, Degrees of Freedom 18, P = 0.000.

CROSSTABULATION 4.41 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE (SEASON TICKET)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
SEASON TICKET	LESS THAN ONCE	1
SEASON TICKET	1 - 2 TIMES	10.5
SEASON TICKET	3 - 4 TIMES	59.5
SEASON TICKET	5 - 6 TIMES	330
SEASON TICKET	7 - 8 TIMES	345
SEASON TICKET	9 - 10	4921
SEASON TICKET	11 - 15 TIMES	3822
SEASON TICKET	16 - 20	1584
SEASON TICKET	21 OR MORE TIMES	1232
TOTAL AVERAGE WEIGHTED TRIPS		11.3

CROSSTABULATION 4.42 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(AREA TRAVELCARD)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
AREA TRAVELCARD	LESS THAN ONCE	9
AREA TRAVELCARD	1 - 2 TIMES	19.5
AREA TRAVELCARD	3 - 4 TIMES	140
AREA TRAVELCARD	5 - 6 TIMES	715
AREA TRAVELCARD	7 - 8 TIMES	390
AREA TRAVELCARD	9 - 10	5491
AREA TRAVELCARD	11 - 15 TIMES	4841.5
AREA TRAVELCARD	16 - 20	2376
AREA TRAVELCARD	21 OR MORE TIMES	1848
TOTAL AVERAGE WEIGHTED TRIPS		11

CROSSTABULATION 4.43 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(COMBINED SEASON TICKET)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
COMBINED SEASON TICKET	LESS THAN ONCE	0
COMBINED SEASON TICKET	1 - 2 TIMES	3
COMBINED SEASON TICKET	3 - 4 TIMES	14
COMBINED SEASON TICKET	5 - 6 TIMES	77
COMBINED SEASON TICKET	7 - 8 TIMES	52.5
COMBINED SEASON TICKET	9 - 10	760
COMBINED SEASON TICKET	11 - 15 TIMES	624
COMBINED SEASON TICKET	16 - 20	234
COMBINED SEASON TICKET	21 OR MORE TIMES	112
TOTAL AVERAGE WEIGHTED TRIPS		10.9

CROSSTABULATION 4.44 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(SCHOLAR PASS)

TICKET / PASS TYPE (Scholar Pass)	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
SCHOLAR PASS	LESS THAN ONCE	21
SCHOLAR PASS	1 - 2 TIMES	46.5
SCHOLAR PASS	3 - 4 TIMES	122.5
SCHOLAR PASS	5 - 6 TIMES	269.5
SCHOLAR PASS	7 - 8 TIMES	172.5
SCHOLAR PASS	9 - 10	1947.5
SCHOLAR PASS	11 - 15 TIMES	1248
SCHOLAR PASS	16 - 20	702
SCHOLAR PASS	21 OR MORE TIMES	532
TOTAL AVERAGE WEIGHTED TRIPS		9.8

CROSSTABULATION 4.45 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(EMPLOYEE PASS)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
EMPLOYEE PASS	LESS THAN ONCE	42
EMPLOYEE PASS	1 - 2 TIMES	49.5
EMPLOYEE PASS	3 - 4 TIMES	66.5
EMPLOYEE PASS	5 - 6 TIMES	66
EMPLOYEE PASS	7 - 8 TIMES	75
EMPLOYEE PASS	9 - 10	579.5
EMPLOYEE PASS	11 - 15 TIMES	286
EMPLOYEE PASS	16 - 20	162
EMPLOYEE PASS	21 OR MORE TIMES	280
TOTAL AVERAGE WEIGHTED TRIPS		7.4

CROSSTABULATION 4.46 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(OAP PASS)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
OAP PASS	LESS THAN ONCE	658
OAP PASS	1 - 2 TIMES	793.5
OAP PASS	3 - 4 TIMES	1540
OAP PASS	5 - 6 TIMES	2024
OAP PASS	7 - 8 TIMES	1335
OAP PASS	9 - 10	1947.5
OAP PASS	11 - 15 TIMES	2314
OAP PASS	16 - 20	972
OAP PASS	21 OR MORE TIMES	588
TOTAL AVERAGE WEIGHTED TRIPS		4.7

CROSSTABULATION 4.47 (NTS)
FIRST TICKET PASS USE AGAINST FIRST TICKET PASS TYPE
(DISABILITY PASS)

TICKET / PASS TYPE	FREQUENCY OF USE (PER WEEK)	AVERAGE WEIGHTED TRIPS
DISABLED PASS	LESS THAN ONCE	39
DISABLED PASS	1 - 2 TIMES	48
DISABLED PASS	3 - 4 TIMES	105
DISABLED PASS	5 - 6 TIMES	137.5
DISABLED PASS	7 - 8 TIMES	150
DISABLED PASS	9 - 10	256.5
DISABLED PASS	11 - 15 TIMES	286
DISABLED PASS	16 - 20	216
DISABLED PASS	21 OR MORE TIMES	140
TOTAL AVERAGE WEIGHTED TRIPS		6.5

CROSSTABULATION 4.51 (MiD)
DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST AGE

AGE RANGE OF RESPONDENTS	YES	NO	TOTAL
0 - 15	0 / 53.7	4 / 37.8	4
16 - 24	2 / 44.8	6 / 31.6	8
25 - 49	62 / 168	81 / 118.3	143
50 - 64	165 / 108.8	131 / 76.7	296
65+	204 / 47.7	83 / 40.7	287
TOTALS	433	305	738

Pearson chi squared = 6208.275, Degrees of Freedom 28, P = 0.000.

CROSSTABULATION 4.52 (MiD)
DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST MODE USED BUS

MODE USED BUS	YES	NO	TOTAL
DID NOT USE	381 / 375.1	259 / 264.9	640
USED	51 / 56.9	46 / 40.1	97
TOTALS	432	305	737

Pearson chi Squared = 1.679, Degrees of Freedom 1, P = 0.195.

CROSSTABULATION 4.53 (MiD)
DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY AGAINST MODE USED UNDERGROUND OR TRAM

MODE USED UNDERGROUND OR TRAM	YES	NO	TOTAL
DID NOT USE	399 / 384.5	257 / 271.5	656
USED	33 / 47.5	48 / 33.5	81
TOTALS	432	305	737

Pearson chi Squared = 11.987, Degrees of Freedom 1, P = 0.001.

CROSSTABULATION 4.54 (MiD)
COMBINED JOURNEY DISTANCE AGAINST DO YOU FEEL IMPAIRED IN YOUR MOBILITY BY YOUR PHYSICAL DISABILITY

Combined Journey Distance	YES	NO	TOTAL
0 - 1 km	129 / 105.3	54 / 77.7	183
1.01 - 5 km	138 / 149.1	121 / 109.9	259
5.01 - 10 km	53 / 57	46 / 42	99
10.01 - 20 km	58 / 55.2	38 / 40.8	96
20.01 - 50 km	20 / 28.8	30 / 21.2	50
50.01 - 100 km	2 / 2.9	3 / 2.1	5
100.01 - 200 km	0 / 1.2	2 / 0.8	2
200.01 - 500 km	4 / 4.6	4 / 3.4	8
TOTALS	404	298	702

Pearson chi Squared = 25.286, Degrees of Freedom 7, P = 0.001.

CROSSTABULATION 4.55 (NTS)
Difficulties against Frequency of bus use

SPECIFIC DIFFICULTY	FREQUENCY OF USE (PER MONTH)	AVERAGE WEIGHTED TRIPS
GETTING TO THE BUS STOP	LESS THAN ONCE	241
GETTING TO THE BUS STOP	1 - 2 TIMES	42
GETTING TO THE BUS STOP	3 TIMES	63
GETTING TO THE BUS STOP	6 TIMES	366
GETTING TO THE BUS STOP	12 TIMES	672
TOTAL AVERAGE WEIGHTED TRIPS		10

CROSSTABULATION 4.55 (NTS) CONTINUED

IDENTIFYING THE DESTINATION	LESS THAN ONCE	55
IDENTIFYING THE DESTINATION	1 - 2 TIMES	7.5
IDENTIFYING THE DESTINATION	3 TIMES	6
IDENTIFYING THE DESTINATION	6 TIMES	36
IDENTIFYING THE DESTINATION	12 TIMES	132
TOTAL AVERAGE WEIGHTED TRIPS		58.3
STANDING WAITING AT THE BUS STOP	LESS THAN ONCE	210
STANDING WAITING AT THE BUS STOP	1 - 2 TIMES	30
STANDING WAITING AT THE BUS STOP	3 TIMES	57
STANDING WAITING AT THE BUS STOP	6 TIMES	330
STANDING WAITING AT THE BUS STOP	12 TIMES	684
TOTAL AVERAGE WEIGHTED TRIPS		10.5
DIFFICULTY GETTING ON OR OFF	LESS THAN ONCE	222
DIFFICULTY GETTING ON OR OFF	1 - 2 TIMES	30
DIFFICULTY GETTING ON OR OFF	3 TIMES	60
DIFFICULTY GETTING ON OR OFF	6 TIMES	366
DIFFICULTY GETTING ON OR OFF	12 TIMES	948
TOTAL AVERAGE WEIGHTED TRIPS		8.5

CROSSTABULATION 4.55 (NTS) CONTINUED

GETTING TO AND FROM THE SEATS	LESS THAN ONCE	157
GETTING TO AND FROM THE SEATS	1 - 2 TIMES	18
GETTING TO AND FROM THE SEATS	3 TIMES	30
GETTING TO AND FROM THE SEATS	6 TIMES	192
GETTING TO AND FROM THE SEATS	12 TIMES	456
TOTAL AVERAGE WEIGHTED TRIPS		16.6
COMMUNICATING WITH DRIVER / CONDUCTOR	LESS THAN ONCE	28
COMMUNICATING WITH DRIVER / CONDUCTOR	1 - 2 TIMES	6
COMMUNICATING WITH DRIVER / CONDUCTOR	3 TIMES	3
COMMUNICATING WITH DRIVER / CONDUCTOR	6 TIMES	30
COMMUNICATING WITH DRIVER / CONDUCTOR	12 TIMES	156
TOTAL AVERAGE WEIGHTED TRIPS		61.9

CROSSTABULATION 4.61 (MiD)
HOUSEHOLD SIZE AGAINST DO YOU CURRENTLY OWN A ROADWORTHY BICYCLE

In this CROSSTABULATION only basic frequencies are given.

NUMBER OF PERSONS	YES	NO	TOTAL
1	510	294	804
2	1892	873	2765
3	1159	323	1482
4	1173	260	1433
5	278	61	339
6 OR MORE	83	25	108
TOTALS	5095	1836	6931

CROSSTABULATION 4.62 (NTS)
HOUSEHOLD STRUCTURE AGAINST NUMBER OF BICYCLES

In this CROSSTABULATION only basic frequencies are given.

HOUSEHOLD STRUCTURE	0 BIKES	1 BIKE	2 OR MORE BIKES	TOTAL
SINGLE ADULTS 65+	829	60	0	889
SINGLE ADULTS 16 - 64	1002	403	0	1405
2 ADULTS HOH/HRP 65+	531	82	23	636
2 ADULTS HOH/HRP 16 - 64	949	328	280	1557
3 OR MORE ADULTS	489	210	206	905
SINGLE PARENT FAMILY	194	156	122	472
2 ADULTS 1 CHILD	226	146	130	503
2 ADULTS 2 CHILDREN	160	132	330	622
2 ADULTS 3+ CHILDREN	157	43	165	265
3+ ADULTS 1+ CHILDREN	167	123	192	482
TOTALS	4704	1684	1448	7736

CROSSTABULATION 4.63 (MiD)
AGE AGAINST MODE USED BICYCLE

AGE IN YEARS	DID NOT USE	USED	NO RESPONSE	TOTAL
0-15	779 / 793.7	81 / 65.8	1 / 1.5	861
16-24	652 / 662.8	66 / 55	1 / 1.2	719
25-49	2441 / 2484	251 / 206	3 / 4.7	2695
50-64	1643 / 1609.5	97 / 133.5	6 / 3	1746
65+	889 / 853.6	36 / 70.4	1 / 1.6	926
TOTALS	6404	531	12	6947

Pearson chi Squared = 49.946, Degrees of Freedom 8, P = 0.000.

CROSSTABULATION 4.64 (NTS)
AGE AGAINST FREQUENCY OF BICYCLE USE

AGE RANGE (YEARS)	FREQUENCY OF USE (PER MONTH)	AVERAGE WEIGHTED TRIPS
5 - 10	LESS THAN ONCE	527
5 - 10	1 - 2 TIMES	172.5
5 - 10	3 TIMES	258
5 - 10	6 TIMES	1260
5 - 10	12 TIMES OR MORE	2040
TOTAL AVERAGE WEIGHTED TRIPS		3.8
11 - 15	LESS THAN ONCE	519
11 - 15	1 - 2 TIMES	213
11 - 15	3 TIMES	144
11 - 15	6 TIMES	852
11 - 15	12 TIMES OR MORE	1740
TOTAL AVERAGE WEIGHTED TRIPS		3.7
16 - 19	LESS THAN ONCE	582
16 - 19	1 - 2 TIMES	49.5
16 - 19	3 TIMES	54
16 - 19	6 TIMES	204
16 - 19	12 TIMES OR MORE	720
TOTAL AVERAGE WEIGHTED TRIPS		2.2
20 - 29	LESS THAN ONCE	1793
20 - 29	1 - 2 TIMES	94.5
20 - 29	3 TIMES	111
20 - 29	6 TIMES	378
20 - 29	12 TIMES OR MORE	1512
TOTAL AVERAGE WEIGHTED TRIPS		1.2
30 - 39	LESS THAN ONCE	1871
30 - 39	1 - 2 TIMES	139.5
30 - 39	3 TIMES	213
30 - 39	6 TIMES	624
30 - 39	12 TIMES OR MORE	1932
TOTAL AVERAGE WEIGHTED TRIPS		2.1

CROSSTABULATION 4.64 (NTS) CONTINUED

40 - 49	LESS THAN ONCE	1614
40 - 49	1 - 2 TIMES	121.5
40 - 49	3 TIMES	123
40 - 49	6 TIMES	504
40 - 49	12 TIMES OR MORE	1620
TOTAL AVERAGE WEIGHTED TRIPS		2.0
50 - 59	LESS THAN ONCE	1297
50 - 59	1 - 2 TIMES	57
50 - 59	3 TIMES	57
50 - 59	6 TIMES	216
50 - 59	12 TIMES OR MORE	864
TOTAL AVERAGE WEIGHTED TRIPS		1.7
60 - 69	LESS THAN ONCE	1022
60 - 69	1 - 2 TIMES	25.5
60 - 69	3 TIMES	12
60 - 69	6 TIMES	198
60 - 69	12 TIMES OR MORE	408
TOTAL AVERAGE WEIGHTED TRIPS		1.5
70+	LESS THAN ONCE	1146
70+	1 - 2 TIMES	12
70+	3 TIMES	12
70+	6 TIMES	66
70+	12 TIMES OR MORE	156
TOTAL AVERAGE WEIGHTED TRIPS		1.2

CROSSTABULATION 4.65 (MiD)
MAIN MODE AGAINST WEATHER ON THE SURVEY DAY

MAIN MODE	SUNNY	LIGHT CLOUD	HEAVY CLOUD	RAIN	SNOW	TOTAL
ON FOOT	733 / 789.5	457 / 467.9	352 / 329.9	431 / 400.5	36 / 34.1	2009
BICYCLE	216 / 192.3	121 / 114	75 / 80.4	78 / 97.6	2 / 8.3	492
CAR PASSENGER	445 / 398	236 / 235.9	130 / 166.3	199 / 201.9	25 / 17.2	1035
CAR DRIVER	777 / 714.2	411 / 423.4	272 / 298.5	349 / 362.4	35 / 30.9	1844
PUBLIC TRANSPORT	493 / 577.4	353 / 342.3	298 / 241.3	308 / 292.9	18 / 25	1470
TOTALS	2664	1578	1127	1365	116	6850

Pearson chi Squared = 818.616, Degrees of Freedom 88, P = 0.000.

APPENDIX B
INTERVIEW WITH CHRISTINE ALBRECHT OF BVG TUESDAY 06/10/2009 14.00 HOURS

Translated from the original German into English by Chris Cook in November 2009

Christine Albrecht is the person responsible for accessibility at BVG.

CC = Chris Cook.
CA = Christine Albrecht.

CC: "Can you tell me please what your role is in BVG and what you are responsible for"?

CA: "I work in the marketing division in the customer relations department. We are a team of five people, four district and one area manager (myself). You probably know that Berlin is divided into twelve districts and my four colleagues are each in charge of three districts. In fact you could say three large towns, as each district has roughly three hundred thousand inhabitants. They have the role of being a contact person for BVG and work within the community E.g. When local politicians or members of the general public have a particular transport related issue they wish to raise with BVG, it's often the case in such a big firm as ours, that they don't know exactly who they can best contact to bring the matter to our attention. There are then my four colleagues, who are well known in their allotted districts and they are the contact people for any questions or issues to do with BVG. I am the area manager for the team and therefore for the whole of Berlin. I have particular responsibility for passengers with a mobility impairment (disabled and elderly people). My main role is on the one hand to explain to the customers why BVG in Berlin behaves in the way it does, and on the other hand, I relay feedback and concerns from our disabled customers to the management at BVG. As you can see, my job has many sides to it, because it deals with many different areas. I write articles for the various magazines and newsletters for the disabled in Berlin, in order to keep people informed as to the progress BVG is making in the accessibility to its network. I also write similar articles for our own customer newsletters and employees journals. I've also been invited for the first time at the end of November, to attend an information day for BVG employees at one of our bus depots. I have to prepare a small information stand, so that the drivers and other staff can see what BVG is doing to improve accessibility to all its vehicles and for all its customers and how they can best help aid this process. I also organise mobility days, where our mobility impaired customers have the opportunity to practice boarding and alighting from our buses and trams without the hustle of other passengers. We also organise a similar day at an underground station once a year, when passengers can practice the same things on a stationary underground train. This year in fact we have two such days lined up in an underground station and one of them is specifically aimed at visually impaired people."

CC: "And what is the difference between these two days? Could you explain a little further please"?

CA: “In the first instance we offer disabled passengers the chance to orientate themselves in our vehicles without other passengers getting in the way. As a blind person for example, you can walk through the vehicle and familiarise yourself with the different types of bus, tram or underground train we have. As a mobility impaired person, you can try boarding and alighting with your rollator (kind of walking frame on wheels) or wheelchair/electric wheelchair and find out the best positions to place them once onboard the vehicle. There are also representatives from BVG there to assist and answer any questions people may have.”

CC: “I see and so you try and make all the different types of vehicle available on the day”?

CA: “Yes! Apart from the underground training, which we do at Alexanderplatz station on a spare platform of line U5, which is not often used and so we can only make a large profile train available for these particular sessions.”

CC: “Thank you for that. How much contact do you have with the drivers themselves? and to what extent are they trained in the particular needs of their disabled passengers”?

CA: “I don’t normally have any contact with the drivers themselves. We are a very large transport operator in a very large city. We therefore have responsibility for different things e.g. The bus drivers or tram drivers belong to different operations departments within the organisation. They are trained there in how to deal with passengers, responding to complaints for example. I can only send through guidelines to these departments relating to specific issues concerning disabled passengers. We have academies where all our bus, tram and underground drivers are fully trained. This of course includes training to deal with disabled travellers. This has most relevance with respect to the bus drivers, as they have the most direct contact with the passengers and so have the most problems to deal with. Tram drivers and even less so underground drivers have relatively little contact with their passengers. One part of a bus driver’s training includes firsthand experience of being in a wheelchair. He/she must then try and board the bus both propelling themselves and then being pushed by another person. This enables them to see things from the perspective of a wheelchair user. From this year there’s also a so-called EU schooling, which has been introduced by the EU and this involves a similar training exercise, but this time as a blind person. The driver is blindfolded and then a bus draws up in front of them, but with the door not directly in front of them. Then they have to attempt to board the bus as a blind person would. They are then fully aware of the challenges blind people face in finding the door and safely boarding the bus. They are some of the practical parts of the training. We also made a film a few years ago now called “Barrierefrei durch den Berliner Nahverkehr” (Barrier free on Berlin Public Transport) which is also shown to the drivers and which demonstrates clearly the potential problems that disabled people have and how the drivers can help them to be overcome.”

CC: “Did you say that the “Day of the white stick” on Thursday 15. October 2009 is something new”?

CA: “The day of the white stick itself is actually an international day, so that isn’t new. Here in Berlin we always have one day a year set aside for disabled passengers to explore an underground train. This year the Berlin society for the blind approached me, to ask whether it would be possible to have a similar day where blind people would be able to go down on the track. One of their members had obviously raised this issue with them and they passed this on to me. Unfortunately shortly after I agreed to this request, there was a case of a lady in Munich, who fell between two carriages trying to board an underground train and was sadly killed. She thought that the gap between two carriages was a door. This incident served to emphasise the importance of such training for blind and partially sighted people, as the task of boarding a train is a lot harder than trying to get on a bus which has stopped directly in front of you.”

CC: “This incident in Munich, didn’t the train driver see anything”?

CA: “No! How should they have noticed? Some people on the platform saw it, but were so stunned by it and didn’t react quickly enough. It must have been just prior to the departure and everything happened so quickly. It also happened to another lady here in Berlin sometime ago, but luckily someone in the carriage saw it and pulled the emergency handle in time and the train was then prevented from moving off. You need to have seen the event happen, in order to react to it.”

CC: “Yes! And you also need to know where the emergency buttons/handles are located, in order to activate them. In London we also have emergency buttons/handles on the underground, but there are many different types of rolling stock on the network and in each different type of train they are located in a different place.”

CA: “Really! Well here in Berlin they are always next to the doors of the trains. There are actually three different types of emergency help points. The buttons for the emergency brakes on the train are located next to the doors. In the case I previously mentioned, one of the passengers activated the brakes, so that the train wasn’t able to depart. Then there is something called an emergency stop button or handle. There is at least one and I think usually two on every station platform. This is a red box mounted on a post. This can be used if someone notices that a person has fallen on to the track and the train hasn’t yet entered the station. When activated, the signal in the tunnel goes immediately to red and the train driver must then stop at this signal before entering the station. He then would contact the signalling centre to find out what the problem is. If the signalling centre say that they know of no obstruction ahead, then the driver must proceed into the station at cautionary speed (7 km/4.5 MPH). This means that he can bring the train to a stop at any time if he notices something on the track.”

CC: “I see and are these at every station”?

CA: “Yes! But we don’t widely publicise this fact, because they may be vandalised or regularly misused by school pupils etc. During such training days as I’ve mentioned, then we do discuss these things with our clients. There are also emergency communication points on most platforms, where you can speak to someone in one of our information centres if you require travel advice etc.

These communication points also have an emergency button on them, if you need to report a more serious incident."

CC: "I'm sure the disabled clients find all this information very useful and reassuring. Safety is a very important topic. There was a case in London earlier on this year, when a visually impaired person fell onto a busy, electrified track at a main line station and was tragically killed. The case wasn't widely reported in the general media, but on certain disabled specialist programmes it was talked about a great deal. The general consensus was though that public transport is safe provided that one takes care. Something which stands out very clearly for me when I compare Berlin and London is the number of staff at stations. In Berlin there are hardly any staff and in London there are staff at almost every station, because we have ticket gates to pass through to gain access to the system. The staff in London are very well trained to offer assistance to passengers who require it. They can help disabled passengers to the correct platform for their journey and can also help them board the train. This high level of assistance is valued by both our own disabled passengers and those visiting London."

CA: "Well, that's great!. Such a service requires a lot of staff and money. BVG currently has debts of around €680 million. We are still continuing our programme of reducing the number of staff at BVG. In the last twenty years we have reduced our numbers from around 30.000 to 11.000 employees and further reductions are planned to bring us down to 10.000 staff over the next few years."

CC: "During the forthcoming training day, what exactly will you be recommending that blind people do in the event that they fall onto the track"?

CA: "There will be mobility trainers there from the local society for the blind. The trainers also had a briefing session with me prior to the event taking place. The trainers will be there to reinforce to the blind attendees the importance of taking care and remind them of the best practices they can use to ensure their safety. i.e. Not to step diagonally from the platform to the train and always to approach it at right angles before attempting to board it. Where can I safely touch the train, to ensure that it's a doorway and not a coupling i.e. the gap between two cars. Of course when the attendees are on the track, we can show them the conductor rail and can advise them always to move back towards the platform edge away from the live rail, as there is usually a position of safety there. The real question is though how much of all this they would remember in the panic of a real incident taking place."

CC: "That's a very good point you make. It is difficult to give clear safety advice to people who've fallen onto the track, as it is a very dangerous place to be in."

CA: "What I would say is that they should lie flat between the two running rails."

CC: "In London this would not be possible, because there is a power rail in the middle of the track as well as on the far side of the track and they would almost certainly be killed by either this or by the train entering the station."

CA: “I see! Well here there is usually sufficient space for them to lie flat, but of course the typical reaction of someone would be to get away from the dangerous situation as soon as possible. For me one of the main points of this exercise is to show people how far they would fall from a platform down onto the trackbed.”

CC: “I think the whole concept is a great one, but I think it is difficult to give advice which is universally applicable as to what to do if you fall on the track, other than to try not to do it in the first place. Do you have regular contact with the societies for the blind and disabled in Berlin”?

CA: “In Berlin there is a working party called “Bahn und Verkehr Barrierefrei” (Train and Transport free from barriers) which is led by the Berlin senate. The group deals in alternate months with either building/construction or with transport. In the group there are representatives from all the different disabled organisations and from the key transport providers, as well as from the senate itself. I know most of these people, as I often attend these meetings. If you have a particular query or problem, then let me know and I can put you in touch with the relevant person who can help you further.”

CC: “Thank you very much. That would be most helpful. A part of my future research may well be speaking to such representatives or with their clients, in order to find out what they think about the current situation and how safe they feel when they’re travelling around the city on public transport. I wanted to ask you whether you had an idea how many disabled people travel on BVG’s services each day?”

CA: “We estimate that around 1500 wheelchair passengers travel on the system each day, but whether they’re travelling alone or with a companion I don’t know. We don’t have a separate estimate for visually impaired passengers. All I can tell you is that we have around 20.000 partially sighted and 6000 blind people amongst the 3.4 million inhabitants of the city.”

CC: “I don’t actually know what the equivalent figures are for London, but there do seem to be many disabled passengers travelling independently there, some of them even with guide dogs. Does BVG have an accessibility plan? i.e. how many stations does it intend to make barrier free”?

CA: “We want to make all our stations barrier free one day.”

CC: “They say the same in London, but being realistic how many stations”?

CA: “It is a realistic target for us. We started twenty years ago and we plan to do about five stations per year and at present we’re managing to stick to this aim. Next year (2010) we may even be able to exceed this, as we received an extra €5 million from the senate to advance this work. The money came from the fines levied on the S-Bahn for its poor performance this year (2009). The work progresses faster when there is more money available and next year statistically around one in two U-Bahn stations will be barrier free.”

CC: “How does BVG define barrier free”?

CA: “It depends what you’re talking about. Barrier free access to the underground (U-Bahn) for us would mean a lift or ramp to and from the platform. It also involves the installation of the so-called “Blindenleitsystem” (Blind guidance system) which are a series of raised grooves to clearly denote the platform edge and strips leading off this guide you to stairs or escalators exiting the platform.”

CC: “Whilst I’ve been travelling around here in Berlin, I’ve come across many different variants i.e. some stations with the guidance system for the blind, but no lifts or ramps. Others with ramps or lifts, but no guidance system etc.”

CA: “As a rule each station firstly receives a basic level of accessibility which includes the installation of the guidance system. This is something we can do ourselves without the need to obtain permission from other authorities. The installation of lifts takes a lot longer, as it can sometimes take years to gain the relevant planning consent. We often have to divert major utilities (power cables, gas and water mains) before work can commence. No station would ever have a lift fitted and no guidance system for the blind installed. It might well be that in a few stations in the former east of the city, that they have ramps there but no guidance system. We are further ahead with the installation of the guidance system as opposed to lifts. We have currently (October 2009) 93 underground stations with the guidance system and 77 underground stations with lifts and/or ramps.”

CC: “Is there accessible information for people about which stations are barrier free”?

CA: “We have extra leaflets with our map printed in them and the stations with lifts and/or ramps are clearly marked on the maps, as they are on those displayed in the trains themselves.”

CC: “Is this information also available in Braille”?

CA: “No! unfortunately not, but all the information is online in a section of our website specifically dedicated to barrier free travel. We have a journey planner service on our website, which also contains full information about accessible stations. In the past few months we’ve further improved the journey planner, so that customers can now specify the degree to which they are dependent upon stations being fully accessible. E.g. a totally barrier free route for a mobility impaired person, in which only journeys will be displayed that are wholly barrier free for wheelchair users i.e. with lifts and without stairs or escalators. Alternatively you could have a partially barrier free route if you have a child’s buggy/heavy suitcase with you, then you might be shown a route still with no stairs, but this time with escalators included. The service is constantly being revised. E.g. We no longer need this service for buses, as all our buses are now barrier free.”

CC: “Yes! But it’s still required for trams until all the old Tatra vehicles have been withdrawn from service in a few years time isn’t it”?

CA: “Yes That’s right!. New low floor trams to replace the old Tatra vehicles are currently being trialled and are due to start being introduced to service in 2010.

Deliveries of all the new vehicles and thereby the withdrawal of the last Tatra is currently scheduled for 2016. Berlin will then have a 100 % low floor tram fleet, to complement fully that of the buses, which has been 100 % low floor since last year (2008). I should add that prior to the football world cup in 2006, some U-Bahn stations in the near vicinity of the Olympic stadium were prioritised to be made barrier free, as it all served to enhance BVG's overall image especially to tourists. There were undoubtedly though some other stations in the city centre, which were much more urgent cases to be made barrier free. The U5 will be the first completely barrier free underground line in Berlin."

CC: "Does BVG have a separate budget for accessibility"?

CA: "Usually funding for lift installations comes from the senate, but all other work to make stations barrier free comes out of our general budget. Towards the end of each financial year, the budget for infrastructure improvements and the general budget are reviewed and if there is still money available, then this is normally put in to further the work to make all underground stations barrier free, but there is no wholly separate fund for this work."

CC: "Is there a target date, by which time all U-Bahn stations have to be accessible"?

CA: "No there's not. We are continuing the work each year as fast as funds will allow and we'll continue to do this until every station has been completed."

CC: "Do you receive feedback directly from your disabled customers? Or only indirectly via the four contact people in your team which you mentioned earlier"?

CA: "I am a single person for the whole of Berlin. I must make that clear. The twelve district authorities in Berlin can contact me directly, but usually go through their respective contact in my team, as I described before. I am also contacted by representatives of the various disabled institutions concerning the training days we run. General comments/complaints/questions from our customers are directed firstly at our 24-hour call centre either by phone or email. They then filter the enquiries and either deal with them directly or forward them on to the relevant department for further attention. Sometimes matters are referred to me, if they concerned disabled passengers. I can't personally be a contact for every disabled passenger in Berlin, as I'd never otherwise have the time to get anything else done here at BVG e.g. working on various projects or raising disability awareness within the organisation."

CC: "How closely does BVG have to take disability equality legislation into account when planning accessibility improvements at stations"?

CA: "Of course we have to stick to the law and there are always different interpretations of equality for disabled people. We work extremely closely with the Berlin senate and the conversion of Berlin into a barrier free city is a very important objective for us all. It is a constant challenge, but one which is well worth it in the long run."

CC: "I realise this is a hypothetical question to end on, but what would you change if you were able to and money was absolutely no object"?

CA: “I would increase the amount of disability awareness training received by our drivers and our other members of staff. I would also install two or more lifts at every underground station instead of just one, so that if one is out of service for whatever reason, the station is still fully accessible to everyone. In my experience I’ve found that the demands and wishes of our customers grow much faster than our ability to fulfil them all.”

CC: “I can imagine. I was surprised when carrying out a small personal accessibility audit for myself about the variety of different layouts and markings of the lifts in stations. Some have Braille on every button. Some have no Braille at all, but tactile lettering instead. Some have absolutely no markings at all on the buttons and the call buttons on the outside are located in so many different places and at many different heights.”

CA: “I know, but as I said, the programme began about twenty years ago and the demands of our passengers have grown and changed considerably in that time and continue to do so. It has to be a compromise at the end of the day. We often get conflicting requests for example, Disabled customers want better service from bus drivers, which would increase dwell time at stops, whilst other passengers want us to put the bus driver in his own closed cab like in a tram, so that they can get from A to B quicker.”

CC: “Do you agree with the theory that public transport can never be fully accessible to everyone in society”?

CA: “That’s difficult as different people have got different degrees of mobility, but as a large transport provider in a big city, we try and cater for everyone wherever possible.”

CC: “Certain able-bodied critics in the UK feel that the large sums of money spent by transport operators on accessibility are simply wasted. The critics feel that they’d be better off spending the money on improving the vehicles themselves or the infrastructure.”

CA: “In our experience we’ve found that improving the accessibility to our services has benefited everyone, not just our disabled passengers. E.g. The guidance system for the blind, which is a series of short ridges running close to the platform edge is a good, visual warning for all travellers to stand well back when waiting for their train.” What I’m not in favour of however would be audible announcements broadcast on the outside of vehicles for example, which visually impaired passengers often ask for. This type of audible information is only going to benefit certain users and doesn’t have universal appeal. Eventually most visually impaired people will have a mobile phone, which will have the facility on it to be able to tell and speak out which bus/tram/underground train is coming next and in which direction. That way they get the information they require, but everybody waiting doesn’t have to hear the announcement.”

CC: “Many people get frustrated with the announcements inside the vehicles, when they’re trying to read or work in peace. What’s the attitude like in Berlin”?

CA: “Announcements inside the vehicles have been common practice here for years, but not announcements outside the vehicles as well. You may know of the scheme in Dresden, where blind people are given a portable handheld device, which they can activate when they arrive at a bus or tram stop. As soon as the next vehicle then approaches, the device picks up a signal and tells the person which number and which direction the vehicle is travelling in. The devices are very discreet and don’t disturb any other people waiting at the stop. That kind of thing is exactly what we want to have in Berlin. We don’t want every vehicle which arrives at a stop announcing out loud its number and destination. This would merely add to the noise pollution, which is also now a hot topic in Berlin. I think GPS technology and mobile phones will have a considerable role to play in enhancing the mobility and independence of visually impaired travellers in the future.”

CC: “I think that’s very true and I myself have high hopes for the future and the beginnings are already well in place.”

CA: “Yes that’s right.”

CC: “Well Christine! May I please take this opportunity to thank you very much for your time this afternoon. It has been a most interesting and useful conversation for my further research.”

CA: “That’s a pleasure. Please keep in touch and let me know if I can help you further at any time.”

APPENDIX C
INTERVIEW WITH BETTINA JESCHEK AND ANGELIKA SIMON OF THE BERLIN S-BAHN FRIDAY 08/10/2010 10.00 HOURS

Translated from the original German into English by Chris Cook in January 2011

Bettina Jeschek is the person responsible for accessibility at the Berlin S-Bahn. Angelika Simon is the head of marketing at the Berlin S-Bahn.

CC = Chris Cook.
BJ = Bettina Jeschek.
AS = Angelika Simon.

CC: "Could you tell me please how many stations on the S-Bahn network are currently classed as accessible stations"?

BJ: "Certainly. Firstly I'd like to point out that the situation regarding the Berlin S-Bahn and its stations is different to that of BVG. BVG as you may know owns all its own trains and stations. The S-Bahn Berlin GMBH (limited company) is an independent run subsidiary of Deutsche Bahn (DB) and all the rolling stock is owned by them. The stations are owned and looked after by another subsidiary of DB namely DB Station and Service. Our current network totals 166 stations, of which 29 have level access or ramps, which are suitable for wheelchairs and 110 have lifts installed. At present 95 of these have also got the tactile blind guidance system. Work is planned at 40 more stations over the next few years and we hope of course eventually to have completed the installation of such systems at 100 % of stations. This aspiration though is still some way off.

As may well have been explained to you during your visit to the Berlin Institute for the Blind, the blind guidance system is also being developed and refined. The early versions had the ridges very close together, but the later versions have ridges which are higher (20mm) and they are more widely spaced. This is so they are much easier to detect by white cane users. The last few stations which have been equipped this year also have square patches of bumps or notches, which indicate things like the top or bottom of flights of stairs or escalators. The problem this gives us though is that we have some stations with the oldest guidance systems, some with a second generation improved version and then some stations with the latest one. We can't of course go back and redo the stations with older versions of the design until the next round of improvements is due there. The main reason for this is of course cost grounds, but you also have to factor in the level of disruption while the work is carried out, as large sections of the platform have to be taken out of use whilst they're being worked on.

There are also certain features at larger stations like Hauptbahnhof, for example Braille notices at the top and bottom of stair handrails, which tell you what platforms you're climbing up to or down from and where the nearest exit is. As the architect at the Berlin blind institute, Herr Peter Woltersdorf doubtless explained to you, there is only a certain amount of information which can be sensibly put on such signs, but for those that read Braille, they certainly find it a

great help to be able to get some useful information when arriving on or exiting a platform."

CC: "Thank you. Can you tell me how the S-Bahn defines accessibility please"?

AS: "We are a transport provider, who wants to provide every Berliner and visitor to our city the opportunity to make use of our extensive public transport network. It is of course a historical fact that the station buildings and there locations were built long before accessibility ever became such a current and important issue. There are so many things which have to be taken into consideration, not just the station entrances and the buildings themselves, but buying a ticket, the route down to the platforms and on the trains themselves of course. These all form part of the complete journey experience. If we then consider how we define a disabled person. These can be people who are restricted in their mobility i.e. have a wheelchair or a white cane or are elderly and for whatever reason, these groups of people find it difficult to use stairs and need level access or a lift to gain access to the platforms. There are also people with a sensory impairment, who find it difficult to move around freely in an unfamiliar environment. There are of course also people with unseen disabilities e.g. learning difficulties. We want to give everyone the opportunity to travel on our network freely and safely." In order to fulfil this aim, there are several programmes in place. As I previously explained, there is one which deals with the installation of the tactile blind guidance system on the platforms. We then have one for the installation and maintenance of lifts. Over the past three years, around €15.4 million has been invested in the installation and maintenance of lifts at our stations. I have to stress that every station is different. Some are listed structures, they come in all shapes and sizes and therefore we can't always put in the same sized lift, with the same layout of buttons, in the same place at every station. We have to make the lift fit into the station as best we can and as such each station has more or less an individually tailored lift installation. There are guidelines which stipulate the minimum size of lift we can install in a station, so that at least one wheelchair/buggy/pram will fit into it, but we try and aim to install the largest lift possible in the space available to us. As each installation is virtually an individual one, we don't hold spare parts in stock for each of them. We do unfortunately have a major problem in Berlin with vandalism. In spite of our best efforts, when a lift is damaged during an attack, it can often take a while for us to order, obtain and fit the necessary spare parts. During this time when the lift is out of use, it has a major impact on the accessibility of the station, as it may well prevent certain regular customers who are reliant on the lift from using, what might well be their local station. I should add that there are some stations where we hardly ever have any problems and of course there are others, at which vandalism is a regular problem. It depends on the catchment area of the particular station, what else is nearby i.e. a night club or other cafés or drinking establishments and how intensely the station is used during the service hours of S-Bahn operation. We have mobile teams of people as part of our station and service teams, who are equipped to deal with small incidents i.e. litter or in winter time grit and salt, which may be preventing the lift doors from closing, or the lift requires some urgent cleaning after being used as a makeshift bathroom.

Wherever possible we try and install lifts, which are less susceptible to vandalism. This depends on the design and mechanism of the lift. Hydraulic lifts

tend to be less prone to breakdowns and don't require as much routine maintenance as cable lifts. As I said before though, every station is different and we have to do the best we possibly can with the space and equipment available.

We rely heavily on our customers though, to notify us as soon as they notice, that a lift is out of order and has been vandalised. We have mobility posters on all our stations with a hotline phone number to ring, so that they can pass this information on to us and we can contact one of our mobile station and service teams, who can be deployed immediately to go and assess the situation further. Disabled customers can also ring this number, if for example they've arrived at a station, have discovered that the lift isn't working and they require further assistance. Customers can also communicate with us via the information points on the platform as well, so there are at least two ways of easily getting in touch and alerting us quickly to a problem. This is also true if people notice anyone acting suspiciously i.e. groups of youths hanging around stations drinking or being abusive. A quick phone call to us can often prevent this type of situation escalating and has in the past almost certainly stopped episodes of vandalism before they've actually taken place which is a very good thing indeed."

CC: "Thank you and can you tell me what other measures are being implemented to make travelling on the S-Bahn easier for people with disabilities"?

AS: "Certainly; with regards to ticketing, we're currently in the process of introducing a new generation of ticket vending machines. Of course people are still able to purchase tickets from ticket windows at larger, staffed stations, but we wanted to give people the freedom to be able to buy a ticket with ease whenever they like and wherever they happen to be on the network. The new generation of machines have bigger, brighter LED screens, which are backlit and you can also adjust the font and print size, to make the screen much easier to read for those with only partial sight. The machines also have induction loop connection, to enable someone with a hearing impairment to contact our help centre, if they require further assistance with either purchasing a ticket or planning their onward journey. The machines also have multi-lingual functionality, which will help the many tourists and visitors to our city each year. There are also lights and Braille markings next to the slots for credit cards, bank notes and coins and from where the ticket is subsequently issued. The project to replace all 501 ticket vending machines by the end of 2011 is being gradually rolled out across the network and is costing in the region of €400.000."

CC: "Actually the issue of buying a ticket is one which I have to contend with whenever I land in Berlin on my own. There is a staffed ticket window at Tegel airport, which is usually open when I land. There are also many ticket machines too and I have no doubt that I could get some help using them, but the biggest issue I have is validating the ticket once I've purchased it. The person selling me the ticket has no way of stamping it before giving it to me and I would have to be wholly reliant on the honesty of a member of the public in the airport bus etc. to stamp it for me in one of the machines, before I'm able to travel legitimately. This isn't a problem back home in London, as once you've purchased a ticket to travel, it's valid and no further stamping in a machine is required. We do have a smartcard system in London for certain journeys and

this has to be touched on a reader at the start and end of a journey, but this is much easier to do and there are always staff around to help if problems arise. I'm fully aware that this is not normally an issue for disabled Berliners, as they are all travelling with their travel pass, but it must surely be an issue for disabled Germans visiting from other cities as well as for people like me arriving from abroad. Are there any measures planned to help address this seemingly simple problem"?

AS: "That's very interesting, and thank you for drawing that to my attention. I don't have a definitive answer at the moment, but this is something which I'll take away from our meeting today and hopefully we'll be able to come up with a solution in the coming months. I must say that this is something which will have to be referred to the VBB as a whole, as we are only one transport operator within this network. We couldn't introduce changes to the validation of our tickets without BVG and the other operators in VBB doing likewise."

CC: "Yes! I understand your point. May we turn our attention now to boarding and travelling on the trains themselves please"?

AS: "Of course. This can be most problematic for wheelchair users due to the varying size of the gap between the platform and the train. This depends on both the platform itself and the type of rolling stock forming the service. We advise all wheelchair users to wait at the front of the platform, so that they'll be right by the driver's cab when the train arrives. The driver can then get out and assist the passenger further. At the end of each platform there are ramps, which are locked to prevent vandalism or theft, but the drivers have a key to unlock the ramp and to place it by the first door of the train. Once the wheelchair person has boarded, the driver returns the ramp back to its original place and locks it again. It is important that the wheelchair person notifies the driver where they wish to alight, so that similar assistance can be given to help the person disembark from the train. Exactly the same advice and procedures are in place for wheelchair users using the U-Bahn. Both BVG and ourselves realise that this situation perhaps isn't ideal and it may be that future generations of S-Bahn and U-Bahn rolling stock will have ramps integrated in them similar to buses and the new trams which are gradually being introduced and this will certainly make the situation easier and give the wheelchair customers a far greater degree of independence. You may well have noticed that most of our rolling stock has designated areas for wheelchair passengers, as well as those with pushchairs, elderly people with other mobility aids or anyone with large pieces of luggage. These are wide areas with tip-up seats, which are flush with the carriage side when not in use. This gives plenty of space for people to position themselves safely and securely and it seems to be very popular and work well."

CC: "Are there such areas on all the types of rolling stock currently in use"?

AS: "There are indeed, although we have more of them on the newer class 481/482s, as they were designed into them from scratch. We have refurbished the class 480s and 485s in the past few years and were able to build in some of these wider spaces during that work."

CC: "Thank you. Finally could you tell me what further access improvements are planned for the future please"?

AS: “In the foreseeable future we’re aiming to carry on installing or upgrading the lifts at many of our stations. We want to reach a point in the next few years where 98 % of our stations are step free. €4 million is being invested in this programme in the next two years and in the same time period a further €4.5 is being invested in the installation of thirty new travelators at some of our busiest stations. These are escalators without steps that people with heavy luggage can use far more easily. The S-Bahn has also undertaken to fund the VBB escort service for the next three years, which I’m sure you know about. This is part of our financial compensation package to Berlin and Berliners for our substandard performance over the past year. The escort service has been doubled as a direct result of our funding which gives us great pleasure. The service is free for anyone to use and allows you to book an escort, who will accompany you from your home to your destination and then back home again. You usually have to request assistance a minimum of twenty four hours in advance, but other than that the system is very easy to use and is extremely well received by everyone.”

BJ: “We also want to improve things like realtime information etc. so that people can register on our website and be kept up to date with delays or lift breakdowns etc. by email or text message. That way we can get the very latest information out to people as soon as it happens and they can plan an alternative route if necessary. This will be especially useful for disabled customers reliant on lifts, as we’ll be able to notify them immediately when a lift for whatever reason goes out of order, so that they can avoid this particular station and hopefully have a smoother, less disrupted journey. Our staff will always be on hand though to help and this won’t change. We also want to roll out the audible announcements on the platforms, which give details of the train just arriving. We already have most of the stations on the Ringbahn so equipped and we aim to continue rolling out this technology on a gradual basis. These audible improvements are also combined with new LCD displays on the platform, which are much easier for people to read and give details of the next three trains due at that platform and when they are scheduled to arrive.”

AS: “Do you have any further questions for us this morning”?

CC: “Not at this time thank you, but I would like to keep in close email contact with you both and would be delighted to come back and share some of the findings of my research with you during a future visit to Berlin.”

AS: “That would be great and we look forward to welcoming you back here again.”

CC: “Well! All that remains is for me to thank you both very much for your time this morning. It has been a most interesting discussion and I’d also like to thank Frau Jeschek for offering me the opportunity to spend a couple of hours riding the S-Bahn network with her directly after this meeting, in order to view some stations with the different variants of both ticket vending machine and blind guidance system.”

BJ: “That’s a pleasure and I hope it will be useful for your research.”

CC: “I’m sure it will be thank you.”

AS: “Please do keep in touch with us and we look forward to seeing you again soon.”

APPENDIX D
INTERVIEW WITH WAYNE TREVOR OF TFL FRIDAY 12/11/2010 15.00 HOURS

Wayne Trevor is the manager of the accessibility and inclusion unit of London Underground.

CC = Chris Cook.
WT = Wayne Trevor.

CC: "Can you tell me please, a little about the function of the accessibility and inclusion unit and your role within it please"?

WT: "Yes of course! The area I work in is the accessibility and inclusion team in London Underground. Our role is basically twofold: the first is internally within the organisation, to help people effectively to understand the needs of disabled and other excluded groups of people. For example: it is my and the team's role to make sure that people who are designing new trains or new stations, or refurbishing any of these things, all those sorts of activities that they understand what the priorities and requirements of excluded groups are."

CC: "So did you have influence in the design of the new 2009 Victoria Line and S-Stock trains"?

WT: "Absolutely so. We helped extensively with the internal design of the new rolling stock and liaised with the different service providers, so that they were clear on what exactly they needed to do. We also worked externally with our inclusion groups, which are comprised of different socially excluded groups, disabled people amongst others. This was to make sure that they were involved in that process and so that they understood what we (London Underground) were doing to improve the system for them. Some of that is market research; some of that is community and stakeholder engagement and that takes on a variety of different activities, depending on what we're doing. We also work very closely with another team called the equality and inclusion unit, who sit at the TfL level, so at the corporate level and they are more strategy focussed e.g. high level strategies for the next twenty years. We are more delivery focussed, although we also get involved in the more strategic elements of that as well."

CC: "So you have meetings with them every so often"?

WT: "Yes that's right; even though they're located in a different building, obviously our work overlaps in many ways. My specific role is that I'm one of six accessibility and inclusion managers in the team, but this number is about to be reduced down to four under the current public sector changes etc. My role is to coordinate and deliver a number of work streams and work packages that help us to achieve our aims and objectives."

CC: "How long have you been working for London Underground"?

WT: "I've been with the Underground for nine years now and have held my current position for the last five years."

CC: “Could you say something about the Underground’s definition of accessibility and what are its particular aims in making the network accessible”?

WT: “It really depends on a number of things. At a very detailed or micro level, we have definitions of what an accessible station or an accessible train is, but what we do at the strategic level is that we tend to talk about social inclusion and that covers a number of areas. Transport for London is one of a number of organisations that are part of the Greater London Authority (GLA) family. This also includes the Metropolitan Police and a few others. It is the GLA and the mayor who defines accessibility, social exclusion and social inclusion and those sorts of things. That is largely where our strategic direction comes from. The mayor has a policy called “Equal life chances for all”, which talks about and I quote: “Equal life chances for all sets out the vision for London to excel amongst global cities and aims to ensure that the GLA group family members of which TfL is one implement policies and actions that benefit all of London’s communities.” The mayor talks about wanting to set the standard, to encourage others to follow that lead. There is a definition for equality given in the document. It is a little broader than accessibility, but it talks about: “An equal society which protects and promotes equal, real freedom and the opportunity to live in the way people value and would choose, so that everyone can flourish. An equal society recognises people’s different needs, situations and goals and removes the barriers that limit what people can do and be.” The work which I do relates to the more transport focussed aspects of that.”

CC: “How interesting! In my view there certainly have been a lot of improvements over the last few years.”

WT: “Yes! The last ten years in particular have seen a huge change in accessibility. As I said before, specifically for the Underground, we look at things like what an accessible station or train is. These things are to some degree defined either by legislation or elsewhere, but it’s important that we can communicate with people in the same language, so that they can understand what we’re talking about.”

CC: “How much input and influence do disabled travellers have on the training of Underground and TfL staff and how is this carried out”?

WT: “For London Underground staff, if we’re talking about staff that are out on the railway helping customers, driving trains, selling tickets, operational managers etc. All these front line staff receive disability equality training on an annual basis. They have to have that training by law, because as well as giving them disability equality training, they are also trained on some of the safety critical elements of railway operations i.e. evacuating disabled people in an emergency either from a station or from a train. They receive five days of training per year, which includes everything which they need to do. The disability equality training is part of that five day annual training package. We are often asked how many hours of this training are dedicated to the disability equality and inclusion training. What we’ve done after feedback over the past few years is rather than have one particular module concentrating specifically on that sort of customer care as a separate entity, it is now featured in all the various parts of the training. E.g. when people are refreshing their ticketing knowledge, there’ll be questions and assessments around what to do and how

to provide ticketing for customers who may not be able for whatever reason to use a self-service terminal to purchase a ticket or top up an Oystercard. Staff who are in non-operational roles receive some disability awareness training when they first start their positions with TfL and this is refreshed every so often, but not on such a regular basis as that for front line staff."

CC: "Who carries out the training? Are there external companies who deliver the appropriate training"?

WT: "No! They are our own internal learning and development staff. We train over eight and a half thousand people a year, which is a huge amount of people. This requires a certain level of skill and they are usually operational staff who carry out the training. The actual content of the disability and equality aspect is reviewed and refreshed every two to three years. This is done in conjunction with a specialist supplier. The last refresh was carried out in 2008. We recruited a company called "Equality Works" who are a major supplier of specialist training in the field of equality and inclusion. They came in and worked very closely with our own internal training staff. They advised us on the content of our equality and inclusion training and how this could best be implemented."

CC: "OK, but referring back to my previous question, do disabled people have any input or influence over the content and delivery of the training"?

WT: "Yes! The "Equality Works" service provider employs disabled people itself who represent the needs of those passengers with special needs. They also receive input and guidance on a strategic level from TfL's own "Independent Disability Advisory Group" (IDAG). This is a group of disabled people, who are paid for by TfL and who advise us on all aspects of our service, to make sure that we are complying with current legislation, regulations and best practice. There are also some other aspects to that process as well, that inform what we should do and how we should do it. For example: we undertake an ongoing mystery shopper survey, and one of these surveys which we carry out concerns accessibility. This involves recruiting disabled people, who then go out and make real journeys on our network in a structured way, so that we can receive and assess the feedback generated by them. The results from this are also fed into things such as staff training. If for example we discover from the results that the service we're offering blind and visually impaired travellers is very good, but that offered to hearing impaired customers is not so good, then we know that the training needs to redress that balance. We aim to retain the areas of current good practice identified and to build on them in the future. The main reason why disabled people don't carry out the training themselves is mainly down to the sheer volume of people that we train each year and it would therefore be quite difficult to make it work on a reliable basis. The elements concerned with disability and equality are however fully integrated into all aspects of the training package. We think that the training we've got and the checking and control mechanisms we have in place are working effectively. Our current performance indicators suggest that they are, but I guess that there is always scope for improvement and we're constantly monitoring the situation. We have tended to find though that this integrated approach to disability awareness training encourages our staff to think of all people as a holistic kind of concept. A lot of the training over the past two years has focussed on people with hidden

disabilities such as learning difficulties or those for whom English is not their mother tongue, as well as those who have obvious physical or sensory impairments."

CC: "Apart from the mystery shopper survey which you've already mentioned, what other mechanisms are in place to monitor and evaluate the effectiveness of the various levels of staff training"?

WT: "We have a number of other surveys at a corporate level. There is a customer satisfaction survey. This involves interviewing customers, who are exiting a station and asking them for their feedback in a structured way on the journey they've just made. We collect equality data on the people surveyed, which enables us to look at whether people with a certain disability, race or faith view the Underground in a different way to other target groups and then we can target some additional research to find out why people for example from the black community believe that we are better or worse at customer service than people from other communities feel we are. Another good check and balance on our progress is offered by our customer service centre. It is a good barometer for the sorts of issues good or bad which customers flag up during their daily journeys. If we start to see a rise in the number of complaints or even praise from a certain community group then that suggests that something might be changing out on the network and there may be some issues, which we then need to address."

CC: "How are TfL's policies concerning disability shaped and determined"?

WT: "Top level policy is mainly shaped and determined by law. All public authorities of which TfL is one have an obligation to consult people on and involve them in their policies, to set out how we're going to improve our service for them. The disability equality scheme is one of them. One of the ways in which we consulted on that was via a citizens jury. This is a way in which we can test the strategies which we believe to be the right ones i.e. we want to improve capacity on the network and we are going to carry this out by providing more tube or bus services on our networks. This is then put to the citizens jury, which contains representatives from all age groups and areas of society including disabled people and we can then ascertain which parts of our proposed strategies are more or less important for the different social groups. The last citizens' jury took place in 2009. All the recommendations and views from the jury are collated into a report for further analysis. Important issues which came out of the last report were things like: the whole journey approach i.e. it's no good just focussing on the Underground, if you then have to use a bus as part of your journey and for some reason that's late or not accessible. Other things highlighted were the physical environment of bus stops and stations, the attitudinal barriers of staff and obviously looking into the future, the safety, security and resilience of the transport networks during the 2012 London Olympics and Paralympics."

CC: "At the end of 2007 you ran a large survey "Towards an accessible tube" [see TfL 2007], which I personally took part in. Can you tell me why a comprehensive set of results was never collated and published from that survey please"?

WT: “At the time we conducted that survey, we had quite a considerable sum of money at our disposal for investment in the network and we therefore had quite ambitious plans to make a third of the network (around 90 stations) step free by 2012. I should point out that these plans were only partially funded, but it was hoped that the remaining funds would be made available to allow us to fulfil these aims. The main objective of the survey was to find out from our customers how best to proceed thereafter. The consultation closed around Christmas 2007 and we spent the next six months or so analysing the results from it. This then brought us to the summer of 2008, which was the time when the pressures on the economy and our funding started to be felt. As well as the global cooling off of the economy, the transport sectors and the Underground had some other issues to deal with. This particularly involved the collapse of one of our PPP companies Metronet and on a political level, there was a change of mayor which also meant a change in mayoral transport policies. These major events in the first half of 2008 not only rendered our future ambitious plans to expand upon our proposed core network of one third of all stations to be step free redundant, but because the original proposal for this core network of one third of step free stations was unfunded i.e. the money had not been earmarked and protected for this, the funds were diverted elsewhere and were no longer available and so the step free programme was put on hold at that time. The research that we did in the survey and the findings which we’ve extracted from it were robust and I think will still stand us in good stead for the next decade and beyond, but back in 2008 they almost became a bit irrelevant for the reasons outlined above. We know what stations we propose to make step free up to around 2015 and the funding for this has been secured. When they have been completed, then we may well conduct a new survey, to ascertain current views as to the best way for us to allocate funds for the expansion of the step free network in the future. As I said, we found some core principles from the research in 2007 and those are what we’ll use in the future, as and when future money becomes available. It’s also worth pointing out that since we conducted that survey, the Crossrail scheme has been given the go-ahead which is brilliant, as this will have a massive impact on some major central London stations. The Crossrail stations fit very well into many of the principles which came out of our earlier research. I.e. most people felt that they ideally wanted busy central London interchange stations such as Liverpool Street, Tottenham Court Road and Bond Street to have easy access and offer good interchange facilities. Because the Crossrail stations will be brand new stations, we’ll be able to implement all the inclusive design principles and appropriate accessibility measures to deliver and achieve these aims. In the meantime we’re making the most of any funding opportunities which arise. We’re using section 106 agreements to good affect across the network where we can e.g. the Westfield shopping centre development and more recently Battersea power station, where there is a proposed extension of the Northern Line from Kennington via a new station at Nine Elms to a new terminus on the site of the former power station. If that scheme does go ahead, then it will of course be built with lifts and level access and all other inclusive design principles from the beginning, which is very easy to do in new build, but far more difficult and costly to do retrospectively.”

CC: “Yes! You make a very interesting point here. New build is very easy to adapt for step free access and so on, but the network that you have dating back to 1863 is surely far more difficult to make accessible to all. What are the plans

to continue improving the current network e.g. the target number of step free stations by 2015”?

WT: “At the moment there are 62 step free stations, following the opening of the final lift down to the Northern Line at Kings Cross St Pancras in October 2010 and the completion of Kingsbury and Southfields stations earlier on in the year. This number will increase to 65 by 2012. The three further stations are Green Park [which was completed in September 2011], Farringdon which is being heavily worked on in relation to both the Thameslink 2000 and Crossrail schemes and Blackfriars, which has been completely rebuilt along with the national rail station and is due to reopen at the end of 2011 [current estimates say spring 2012]. That then represents 24.1 % of the network (65/270) stations, which will be step free by the time of the London Olympic and Paralympic games. The next phase of improvements will come with the opening of Crossrail, which will give us new, step free stations at Whitechapel, Liverpool Street/Moorgate, Farringdon/Barbican, Tottenham Court Road, Bond Street and Paddington Hammersmith & City Line station platforms 15 and 16. Those six stations together with Victoria, which is a separate project which has now finally been given the green light then bring us up to 72 stations by around 2018. There is also a limited budget to progress the designs for a number of other stations. Where the money gets allocated is subject to change depending on a number of different things, but there are plans for some changes to Bank station, as part of some development which is going on there including the interchange between Bank and Monument stations. Other plans involve some of the busy Victoria Line interchange stations e.g. Highbury & Islington, Finsbury Park and Vauxhall. As I said, these projects are not yet fully funded and so we can’t fully commit to them at this stage, but they are the obvious next candidates for improvement and congestion relief works, as soon as potential funds become available. We don’t have any firm targets beyond that yet, as we’d have to wait for the next spending review, which isn’t due until around 2013-2014.”

CC: “Are there any plans for improvements at Baker Street, which is a station I use very regularly when travelling to and from university”?

WT: “No! Sadly not. Baker Street was one of those stations along with a number of others, which were put on hold or deferred indefinitely, when our funding for specific works stopped. All of the other works which are still ongoing at the moment with the exception of Green Park are parts of much bigger capacity changes and so we don’t have any specific projects just for step free access or accessibility improvements and we probably won’t have for a couple of years yet until more funding becomes available.”

CC: “Thank you very much for that full answer. Are there plans though to continue rolling out smaller measures like the tactile markings along the platform edges and the audible announcements on platforms”?

WT: “The PPP contract which were the Metronet and Tubelines contracts included all of that work and they managed to deliver about two thirds of that, before Metronet went into receivership and was reabsorbed back in to TfL. As I’m sure you’re aware, the PPP contract has now largely gone. Firstly looking at the question of audible announcements on platforms, many stations now have

the equipment for this already installed, but the signalling system which controls it has not yet been upgraded. This needs to happen in order for it to work correctly. This affects the subsurface lines more than the deep level tube lines, which already have many stations which offer this facility. Some of that balance will be redressed following all the signalling upgrades connected with the introduction of the S Stock on the subsurface lines, which is just starting to commence now on the Metropolitan Line (November 2010) and will run until around 2018. The tactile markings along the platform edges we recognised were so important than say general refurbishment works, that we're running a separate scheme for this. The last time I checked which was at the end of October 2010, around 75 % of all platforms had had the tactile marking strips installed along their edges. We have a number of separate projects working to deliver this and we're trying to be very cost effective in the way we do that work. We're very aware that such a system only works effectively when it's a complete system and so there's no point in only doing half a platform at a time and then having a long delay before the other half gets done. I don't have a precise timescale for this, but it will take another year or two rather than a few months until all platforms have been so treated. These programmes also include fitting all stations with the tactile markings at the top and bottom of flights of stairs and making improvements to the colour contrast of handrails on staircases. We're hoping to have all such work finished by the summer of 2012."

CC: "In light of the current economic climate we're in at present, are you concerned in any way that staffing levels on the Underground may have to be reduced"?

WT: "There are some proposals at the moment to reduce staffing of some ticket offices. What we've found over the last six to eight years i.e. since we've introduced oyster is that the number of tickets sold at ticket offices has reduced significantly and there are a number of stations, which now sell fewer than ten tickets an hour. The proposals are designed to move some of those staff out of those ticket offices at certain times of the day on to the gate lines or platforms as required. This isn't reducing staff per se, but just moving them into areas where they're better able to help people. So in that respect, my view is that these changes, rather than hindering people, in particular disabled people, they should actually help them, because there will be an increase in front line staffing levels at busy times. We will of course be monitoring this closely to see how that works, once any teething troubles have been overcome. The mayor as I understand it has also made a mayoral commitment to continue to staff stations and that's a promise that the Underground are still honouring. I.e. while stations are open, those which are currently staffed will continue to be so and that happens to be the majority of stations on the network. Customers from all walks of life tell us that a staff presence at stations is a really good thing, from the safety and security perspective as well as from the help and assistance perspective."

CC: "Thank you! Can you tell me please about the work currently being undertaken in preparation for the London 2012 Olympics and Paralympics"?

WT: "There's lots of work going on at the moment in preparation for both sets of games. The ODA "Olympic Delivery Authority" is responsible for coordinating all the work and making sure that all the parties involved fulfil their obligations. The

Underground and TfL as a whole are of course one of the major players involved in this process. There's a lot of physical work ongoing at the moment such as major improvements at Stratford station which are costing in the region of £100 million. A further £80 million is being spent on the Docklands Light Railway which includes strengthening the network to be able to deal with the lengthening of the trains from two to three cars. A lot of the work which was already being undertaken by the Tube such as the Jubilee Line upgrade and the lengthening of those trains from six to seven cars and the 20-30 % capacity increase afforded by the new signalling system will also deliver some big benefits. There's a huge amount of planning currently ongoing which is looking at transport during the time of the games. This involves things like expected demand and working out when that demand will happen, which will enable us to plan our service patterns to be able to cope with it when it arises. Part of that process is concerned with the provision of services for disabled travellers. This involves working out how we might deal with two, three or ten times the number of customers requiring assistance from staff than we're normally used to. The ODA has its own transport strategy which sets out such things and this also includes an accessible transport plan. This specifically looks at other forms of accessible transport which might be required, where mainstream public transport just can't assist disabled people. E.g. the lifts at Stratford station; even though we've put more lifts in, the combined capacity of all the lifts is still less than the total we think we'll need for this station. We're therefore looking at other ways to solve this problem. The Tube will inevitably play a critical part in moving people around during the games and there'll be all the other services too such as the new DLR extension to Stratford International, the high speed domestic Javelin services from St Pancras International direct to the Olympic park, the frequent London Overground services to Stratford, as well as a myriad of bus services, taxis and also water services. There's a plan for every Olympic venue, so it's not just Stratford and the Olympic park. The plans will take into account which parts of the Tube network will be accessible and what parts won't be. E.g. all the stations on the Jubilee Line extension are step free and accessible, but we know that the Central Line is not step free when travelling to and from Stratford. We're not really doing much to try and change that, because there are plenty of other accessible options which we'll be encouraging people to use instead.

Another example which affects the Tube is Southfields station, which is the nearest stop to the "All England Club" where the annual Wimbledon tennis tournament is held every June/July and where the Olympic tennis will take place. As I previously mentioned, Southfields station on the Wimbledon branch of the District Line is now entirely step free."

CC: "In London, particularly in zones 1 and 2, the 100 % low floor bus fleet offers an accessible, albeit slower alternative to most underground journeys. Are you able to comment on to what extent this affects people's choice of mode please"?

WT: "We are aware of this and one of the plans constantly to improve the accessibility of the Underground is about providing an equitable service. For example: if you're travelling from Kings Cross to Brixton, you can either make that journey via two accessible buses or of course by the Victoria Line of the Underground. Even if the first bus is waiting when you arrive at the stop in Kings

Cross, that journey will probably take around an hour or so and if it's at peak times, it's likely to be more than that. The same journey on the Victoria Line should take twenty-twenty five minutes, provided of course that there's no unforeseen service disruption at the time you're travelling. So clearly it's fine for TfL to say that there's an accessible bus service, but it's not the same level of service which is offered by the Underground. One of the comparisons we've made in upgrading the Victoria Line with the new trains and accessibility features at the stations is that it represents the quickest way between these two points for a wheelchair user, visually impaired traveller and everyone else for that matter. Even if you drove or got a taxi, it'd still be quicker by tube."

CC: "Can you tell me how level access is achieved between the platform and the train, as even with the new 2009 Victoria Line trains, there still seems to be a gap when stepping onto the vehicles"?

WT: "What we've done is to introduce what is called a platform hump. This is a raised part of the platform typically located in the middle, which is about thirty metres long and has a shallow ramp at either end of it. They provide level access to both the old and new trains as set out in the rail vehicle disability regulations. That stipulates that the horizontal gap between platform and train should be no more than 75mm and the vertical step no more than 50mm. I must stress that those are the minimum requirements and we do better than that on the Underground."

CC: "Thanks very much for your helpful explanation. I tend to be at one end of the train or the other when travelling, so have obviously missed noticing these humps in the middle of the platform."

WT: "These humps are being provided at most of the Victoria Line platforms and we're doing something similar on the subsurface network. Because the design of the new S stock trains is radically different to that of the current A, C and D stock trains, i.e. the floor is about 100mm lower on the new trains, we're making the humps fit with those but they won't offer level access onto the old stock trains. Eventually the S stock will replace all the current subsurface rolling stock and this unified fleet will greatly facilitate level access on all the subsurface lines. These humps won't be at every station, but there's around 90 stations that will be so equipped. We're also designing a number of improvements into the journey planner on the TfL website, which will allow people to be able to select for example a step free journey from A to B. We're hoping that the improved planning tool will go live sometime in mid 2011."

CC: "Thank you and just finally, how do you see the next ten years panning out with regards to accessibility improvements on the whole of the Underground"?

WT: "It's very interesting you should ask that. I was recently asked to write an article on improvements in the transport market over the last ten years. I've worked in the industry for almost all of that time and I was quite amazed at just how much has actually happened in that time. When the Jubilee Line extension opened at the end of 1999-the beginning of 2000 so just over ten years ago, it doubled over night the number of step free, accessible stations on the network. Since then we've more than doubled that number again i.e. from 29 to the present figure of 62, which represents a huge change in the overall accessibility

of the network. I think the next ten years will be the decade of the train. By the time we leave the decade we will have completely new and RVAR (Rail Vehicle Accessibility Regulations) compliant trains on the Victoria and all the subsurface lines, which together correspond to two thirds of the entire fleet. We will have refurbished or replaced trains on pretty much all the other tube lines as well, as that's what the law tells us we have to do. You'll therefore be able to get on any London Underground train and it will have a common set of features for disabled people. There'll also be huge capacity improvements in the signalling and control systems which will come with the new trains and this will have a bearing on features like the audible platform announcements we discussed earlier. They'll be more trains, which will be quicker and more reliable. Crossrail will be open by the end of the decade too, which will suddenly take away a lot of the current pressure on the Tube particularly in the central area. It'll also provide a huge change in accessibility with purpose built new step free stations. It will connect with some very big places; the city is not a particularly accessible location at the moment, but this will radically change. We will also continue to expand our network of step free stations and will have hopefully completed another ten or so by the end of the decade. We should also have firm plans in place by that time for the next stations to be worked on from around 2020 onwards, even if this work progresses at a slightly slower rate. It's also worth mentioning that the pace of technological change is simply immense. If you look at what's happened in the last five years in terms of personal handheld devices, mobile phones etc. I think the next ten years will provide a huge change in that area and I think that some technological advances are uniquely placed to really assist many disabled travellers get around more freely."

CC: "I think you make a very valid point here. The only thing I'd add to that is that with the population getting steadily older, some of the more elderly members of society either don't want to or are unable to use and interact with such technology. Therefore it should not be considered as a panacea for solving all accessibility issues. There will also be times of technical failure which will render such electronic systems useless too, so a complete reliance on such technology would inevitably be problematic."

WT: "Absolutely! It clearly won't work for everyone and we won't stop making physical improvements to our network wherever possible, but I think when we get some further refinements to the mass consumer technology which is already out there, it will be a useful mobility aid which will boost people's confidence at the same time. Even if the technology isn't able to guide you through a station that you were unfamiliar with, it could give you an immediate link with somebody, who could guide you through the station either over the phone or personally once they'd come over to you. I think such technology will also start filling in the gaps in providing information. At the moment with any big train project we do, we spend a lot of time and money ensuring that the onboard and platform information is aligned and works correctly. In ten years time we probably won't bother doing this so much, because most people will have a gadget, which is much more useful to them and there won't be the need for the current "all things to all people approach." The point is that information and the way we access and interact with it will change dramatically in the next ten years and that will be a big improvement for lots of people. That's very pie in the sky I know and we don't have any firm plans in place at the moment, but those are purely my own thoughts and opinions."

CC: “Wayne! May I please take this opportunity to thank you very much for your time this afternoon in helping me with my research. I really do appreciate it and it has been an extremely useful and enlightening discussion.”

WT: “Thanks very much Chris! I’ve enjoyed it too and please don’t hesitate to get in touch with me again, if I can help you further in any way.”

APPENDIX E
LIST OF INTERVIEW QUESTIONS

1. Could you describe the role and work of the accessibility unit here at (BVG/Berlin S-Bahn/TfL) please?

2. Could you outline BVG's/Berlin S-Bahn's/Tfl's policy on accessibility, and how it's defined?

3. How much direct influence does the unit have on disability awareness training for all staff? And how is this carried out and what monitoring mechanisms are in place to evaluate and improve the training?

4. What role do disabled passengers/user groups actually have in shaping BVG's/Berlin S-Bahn's/Tfl's policies and ultimate expenditure on accessibility improvements? And how often do such committees meet?

5. Whilst accessibility at stations is gradually improving for many travellers e.g. visually impaired ones with the provision of tactile floor markings at the top and bottom of stairs and along the edge of platforms and audible announcements on board the trains and on some platforms prior to their arrival, does BVG/Berlin S-Bahn/TfL plan to continue rolling these improvements out across the network? And do you envisage a time when every station on the network will be so equipped?

6. Are there similar plans to make all bus stops fully accessible too?

7. Does BVG/Berlin S-Bahn/TfL have one budget for improving accessibility? And how often is this reviewed?

8. Are there mechanisms in place to evaluate the effectiveness of one package of improvements over another?

9. In your view what challenges does BVG/Berlin S-Bahn/TfL still face in making all its networks accessible to all travellers e.g. The installation and maintenance of lifts at Underground stations for wheelchair users? The provision of ramps to enable wheelchair users to board and alight from trams?

10A. The high level of staff on the London Underground is often seen as the jewel in TfL's crown, as help is on hand for disabled and able-bodied travellers alike. In the light of the comprehensive spending review, are you concerned that numbers of staff at stations may have to be reduced with a detrimental effect on the levels of customer service and assistance which can be provided by them?

10B. The high level of staff on the London Underground is often seen as the jewel in TfL's crown, as help is on hand for disabled and able-bodied travellers alike. Are there any plans to increase staff numbers on the Berlin S-Bahn/U-Bahn network? To increase the levels of customer service and assistance which can be provided by them?

11. With the TfL bus fleet having been totally low floor since 2005 and the BVG bus fleet since 2008, many disabled travellers have an alternative to the

underground albeit with a typically slower journey time? Are buses listed as a step free alternative mode to Underground/S-Bahn/U-Bahn when planning your journey either on line or by phone?

12. How do you see the role of the accessibility unit at BVG/Berlin S-Bahn/TfL developing over the next five years? and if funding were no constraint and you could change one thing what would it be and why?